

Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

## **M E M O R A N D U M**

**TO:** John Mitnik, Assistant Executive Director, Executive Office Staff

**FROM:** SFWMD Staff Environmental Advisory Team

**DATE:** May 31, 2023

**SUBJECT:** Weekly Environmental Conditions for Systems Operations

### **Summary**

#### **Weather Conditions and Forecast**

An upper-air trough of low pressure over the central Gulf of Mexico will drift eastward into Florida over the next several days. This unusual weather feature will draw copious tropical moisture northward into Florida and produce a multi-day heavy rainfall event in the SFWMD. On Wednesday, the deep tropical air mass will overspread the entire SFWMD, which will fuel the development of numerous heavy showers and thunderstorms, perhaps at a broad scale. Due to the slow movement, widespread heavy rainfall will be a possibility through Friday across the SFWMD. On Saturday, the upper disturbance will be located east of Florida, and a drier air mass will overspread the SFWMD from the north. This will result in a substantial reduction in daily rainfall this weekend. For the 7-day period ending next Tuesday morning, SFWMD total area-averaged rainfall is likely to be above average.

#### **Kissimmee**

Releases were made as needed from East Lake Toho and Lake Toho to continue their recessions to their respective low pools on June 1. Weekly average discharges on May 28, 2023, at S-65 and S-65A were 330 cfs and 310 cfs, respectively. Mean weekly water depth on the Kissimmee River floodplain of 0.13 ft was essentially unchanged from the previous week. The weekly average concentration of dissolved oxygen in the Kissimmee River decreased from 7.4 mg/L last week to 7.1 mg/L for the week ending May 28, 2023, above both the potentially lethal level and the physiologically stressful range for largemouth bass and other sensitive species.

#### **Lake Okeechobee**

Lake Okeechobee stage was 13.90 feet NGVD on May 28, 2023, which is 0.18 feet higher than the previous week and 0.40 feet lower than a month ago. Average daily inflows (excluding rainfall) increased from 307 cfs the previous week to 1,091 cfs. Average daily outflows (excluding evapotranspiration) decreased from 2,983 cfs the previous week to 1,132 cfs.

The most recent satellite image (May 27, 2023) from NOAA's Harmful Algal Bloom Monitoring System showed that the bloom potential was medium to high in Fisheating Creek and in the nearshore areas of the Lake. The overall bloom potential decreased compared to the previous week, especially in the southern part of the Lake.

The tenth foraging bird survey of the season was conducted on May 25, 2023. A total of 5,920 foraging birds were recorded on the Lake, which was significantly more than a month ago and above the five-year average.

### **Estuaries**

Total inflow to the St. Lucie Estuary averaged 698 cfs over the past week with no flow coming from Lake Okeechobee. Mean salinities increased at the US1 Bridge and HR1 sites and remained the same at the A1A Bridge site over the past week. Salinity in the middle estuary was in the optimal range (10-25) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 1,853 cfs over the past week with 1,177 cfs coming from Lake Okeechobee. Mean surface salinities increased at Cape Coral and Shell Point and decreased at the remaining sites in the estuary over the past week. Salinities were in the optimal range (0-10) for tape grass in the upper estuary. Salinities were in the optimal range for adult eastern oysters at Cape Coral (10-25) and in the upper stressed range at Shell Point and Sanibel (>25).

### **Stormwater Treatment Areas**

For the week ending Sunday, May 28, 2023, 200 ac-ft of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2024 (since May 1, 2023) is approximately 2,100 ac-feet. The total amount of inflows to the STAs in WY2024 is approximately 52,400 ac-feet. Most STA cells are at or near target stage, except STA-5/6 where most cells are below target. STA-1E Western Flow-way is offline for post-construction vegetation grow-in, STA-1E Central Flow-way is offline for a Refurbishments project survey. STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown, and STA-2 Flow-way 2 is offline for post-construction vegetation grow in. Operational restrictions are in effect in STA-1E Eastern Flow-way, STA-1W Eastern, Western, and Northern Flow-ways, and STA-2 Flow-ways 3 and 4 for vegetation management activities. STA-1E Central Flow-way, STA-1W Northern Flow-way, Cell 8, STA-2 Flow-way 3, and STA-5/6 Flow-ways 2 and 6 contain nests of Migratory Bird Treaty Act protected species. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

### **Everglades**

Stage across the Everglades Protection Area increased last week as wet season rains began in earnest. However only northwestern WCA-3A experienced poor rates of change last week. Increasing numbers of White Ibis are nesting in the eastern Refuge. In Everglades National Park, the Cabbage Bay colony remains active, with both Wood Storks and White Ibis increasing in numbers. Heavy rainfall increased depths across Taylor Slough, with stages now aboveground at all locations. Average salinity fell last week in Florida Bay and is now below the average for this time of the year.

## **Biscayne Bay**

Total inflow to Biscayne Bay averaged 504 cfs, and the previous 30-day mean inflow averaged 300 cfs. The seven-day mean salinity was 30.0 at BBCW8 and 29.2 at BBCW10, both within the ideal salinity range for estuarine organisms in this region (salinity less than 35). Data provided by Biscayne National Park.

## **Supporting Information**

### **Kissimmee Basin**

#### ***Upper Kissimmee***

On May 28, 2023, mean daily lake stages were 55.1 feet NGVD (0.1 feet below schedule) in East Lake Toho, 52.1 feet NGVD (0.1 feet below schedule) in Lake Toho, and 50.3 feet NGVD (0.8 feet below the approved temporary deviation schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

#### ***Lower Kissimmee***

For the week ending May 28, 2023, mean weekly discharge was 330 cfs at S-65 and 310 cfs at S-65A. Mean weekly discharge from the Kissimmee River was 430 cfs at S-65D and 430 cfs at S-65E (**Table KB-2**). Mean weekly headwater stages were 46.1 feet NGVD at S-65A and 28.2 feet NGVD at S-65D on May 28, 2023. Mean weekly river channel stage of 33.0 ft NGVD on May 28, 2023, was essentially unchanged from the previous week (**Figure KB-4**). Mean weekly water depth on the Kissimmee River floodplain of 0.13 ft for the week ending May 28, 2023, was essentially unchanged from the previous week (**Table KB-2, Figure KB-5**). The weekly average concentration of dissolved oxygen in the Kissimmee River decreased from 7.4 mg/L the previous week to 7.1 mg/L for the week ending May 28, 2023 (**Table KB-2, Figure KB-6**).

#### ***Water Management Recommendations***

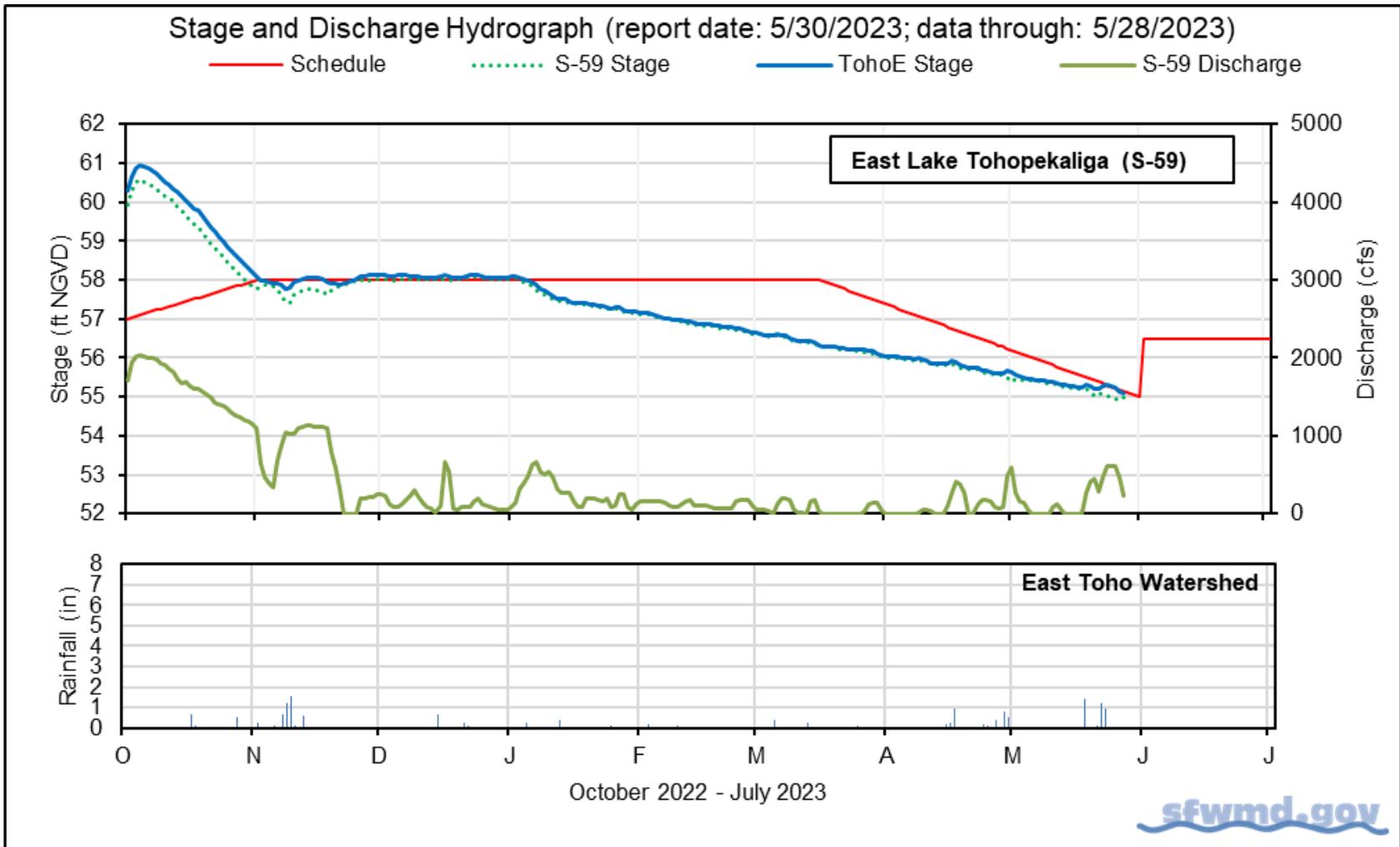
Through May 31, continue stage recessions in Lake Toho and East Lake Toho to their June 1 low pools while maintaining at least 300 cfs discharge at S-65A. Starting Thursday June 1, follow the IS-14-50 discharge plan for S-65/S-65A, including limiting lake stage ascension rates to 0.25 ft/week to the extent possible in East Lake Toho, Lake Toho and KCH.

**Table KB-1.** Average discharge for the preceding seven days, Sunday’s average daily stage and Sunday’s average daily departure from KCOL flood regulation lines or temporary schedules. All data are provisional.

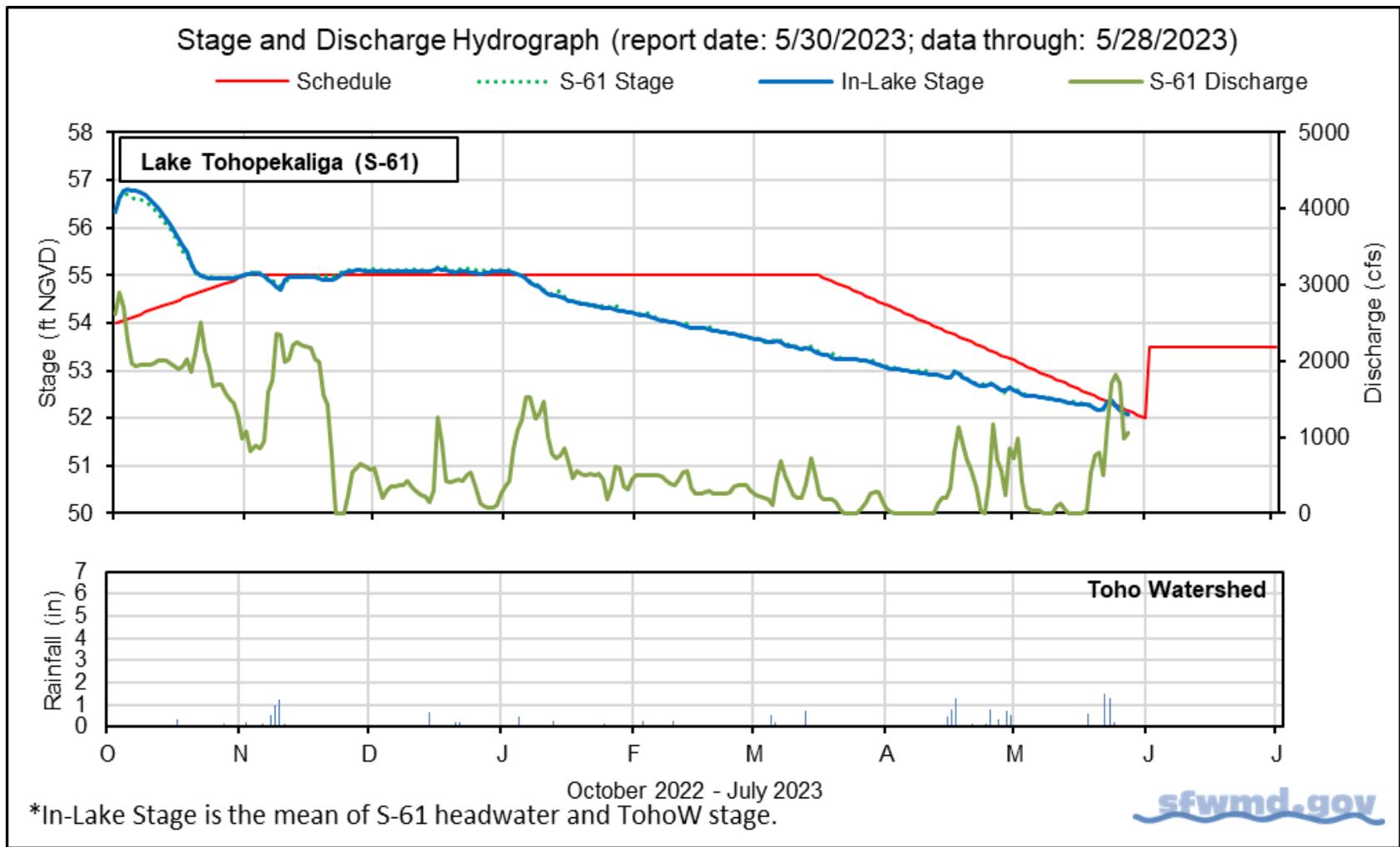
Water Body	Structure	Stage Monitoring Site	Weekly (7-Day) Average Discharge (cfs)	Sunday Lake Stage (feet NGVD) <sup>a</sup>	Schedule Type <sup>b</sup>	Sunday Schedule Stage (feet NGVD)	Sunday Departure from Regulation (feet)	
							5/28/23	5/21/23
Lakes Hart and Mary Jane	S-62	LKMJ	81	59.5	R	59.6	-0.1	-0.1
Lakes Myrtle, Preston, and Joel	S-57	S-57	0	60.0	R	60.0	0.0	-0.3
Alligator Chain	S-60	ALLI	130	62.1	R	62.1	0.0	0.0
Lake Gentry	S-63	LKGT	190	59.6	R	59.6	0.0	0.0
East Lake Toho	S-59	TOHOE	470	55.1	R	55.2	-0.1	-0.2
Lake Toho	S-61	TOHOW S-61	1300	52.1	R	52.2	-0.1	-0.3
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	330	50.3	T	51.1	-0.8	0.4

a. Names of in-lake monitoring sites and structures used to determine lake stage. If more than one site is listed, an average is reported.

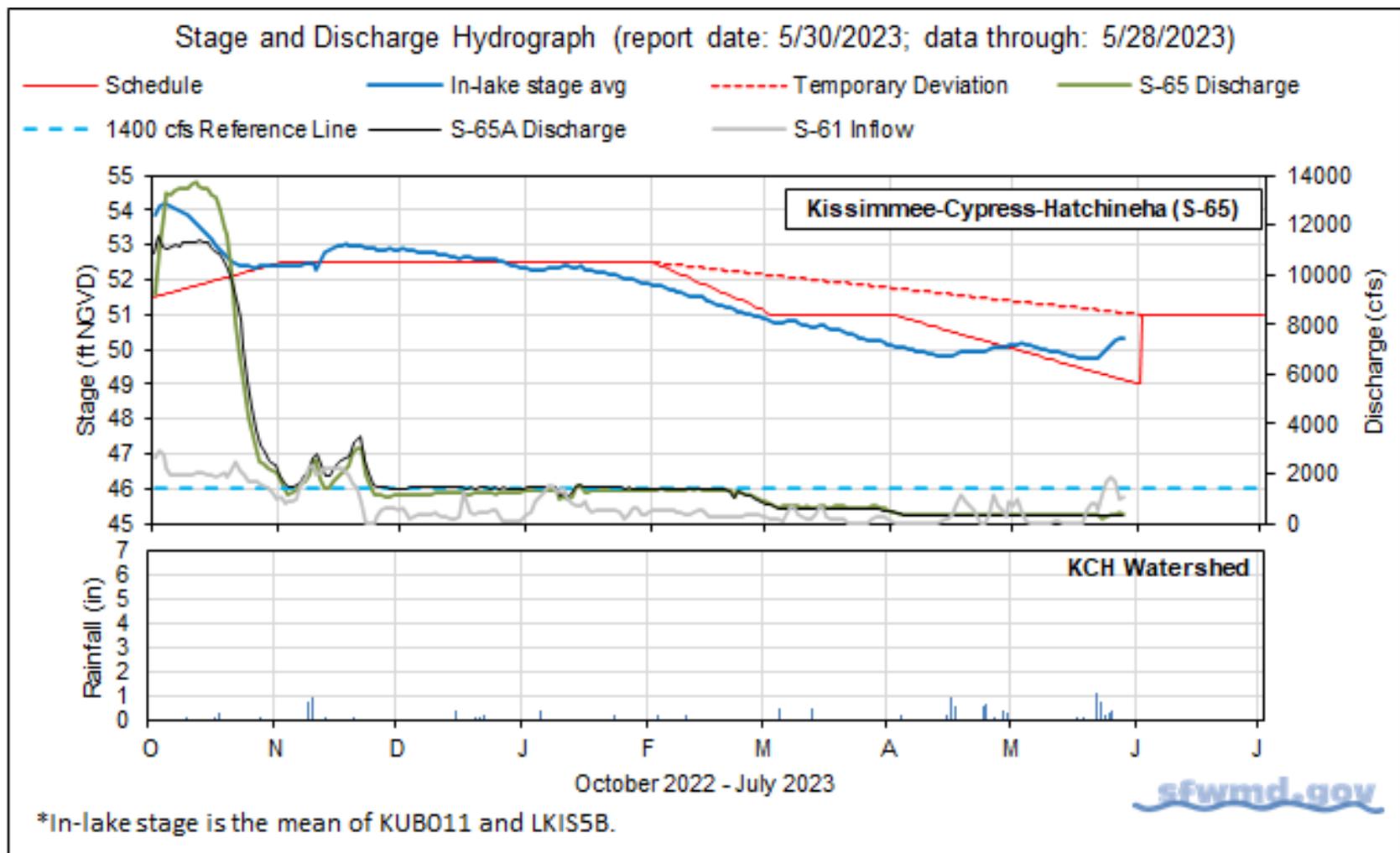
b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.



**Figure KB-1.** East Lake Toho regulation schedule, stage, discharge, and rainfall.



**Figure KB-2.** Lake Toho regulation schedule, stage, discharge, and rainfall.



**Figure KB-3.** Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge, and rainfall.

**Table KB-2.** One- and seven-day average discharge and stage at Lower Kissimmee basin structures, river channel dissolved oxygen concentrations, and water depths in the Phase I area floodplain. All data are provisional.

Metric	Location	Sunday Daily Average	Weekly Average for Previous Seven Day Periods			
		5/28/23	5/28/23	5/21/23	5/14/23	5/7/23
Discharge	S-65	330	330	350	350	360
Discharge	S-65A <sup>a</sup>	310	310	310	310	310
Headwater Stage (feet NGVD)	S-65A	46.4	46.1	46.4	46.3	46.3
Discharge	S-65D <sup>b</sup>	340	430	300	280	260
Headwater Stage (feet NGVD)	S-65D <sup>c</sup>	28.0	28.2	28.3	28.3	28.4
Discharge (cfs)	S-65E <sup>d</sup>	410	430	260	260	230
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) <sup>e</sup>	Phase I, II/III river channel	7.9	7.1	7.4	7.9	8.3
River channel mean stage <sup>f</sup>	Phase I river channel	33.0	33.0	32.8	32.8	32.8
Mean depth (feet) <sup>g</sup>	Phase I floodplain	0.13	0.13	0.08	0.07	0.08

a. Combined discharge from main and auxiliary structures.

b. Combined discharge from S-65D, S-65DX1 and S-65DX2.

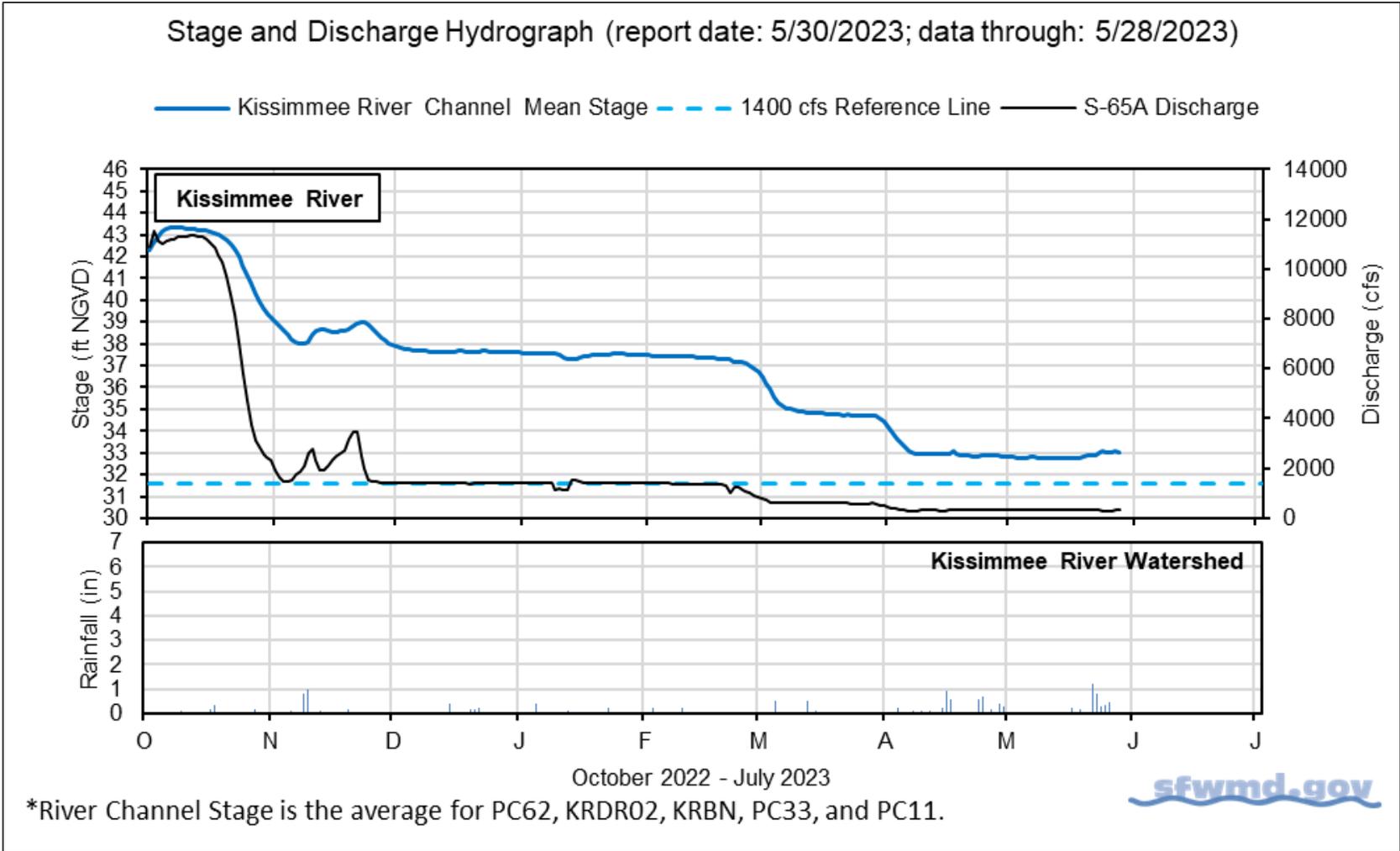
c. Average stage from S-65D and S-65DX1.

d. Combined discharge from S-65E and S-65EX1.

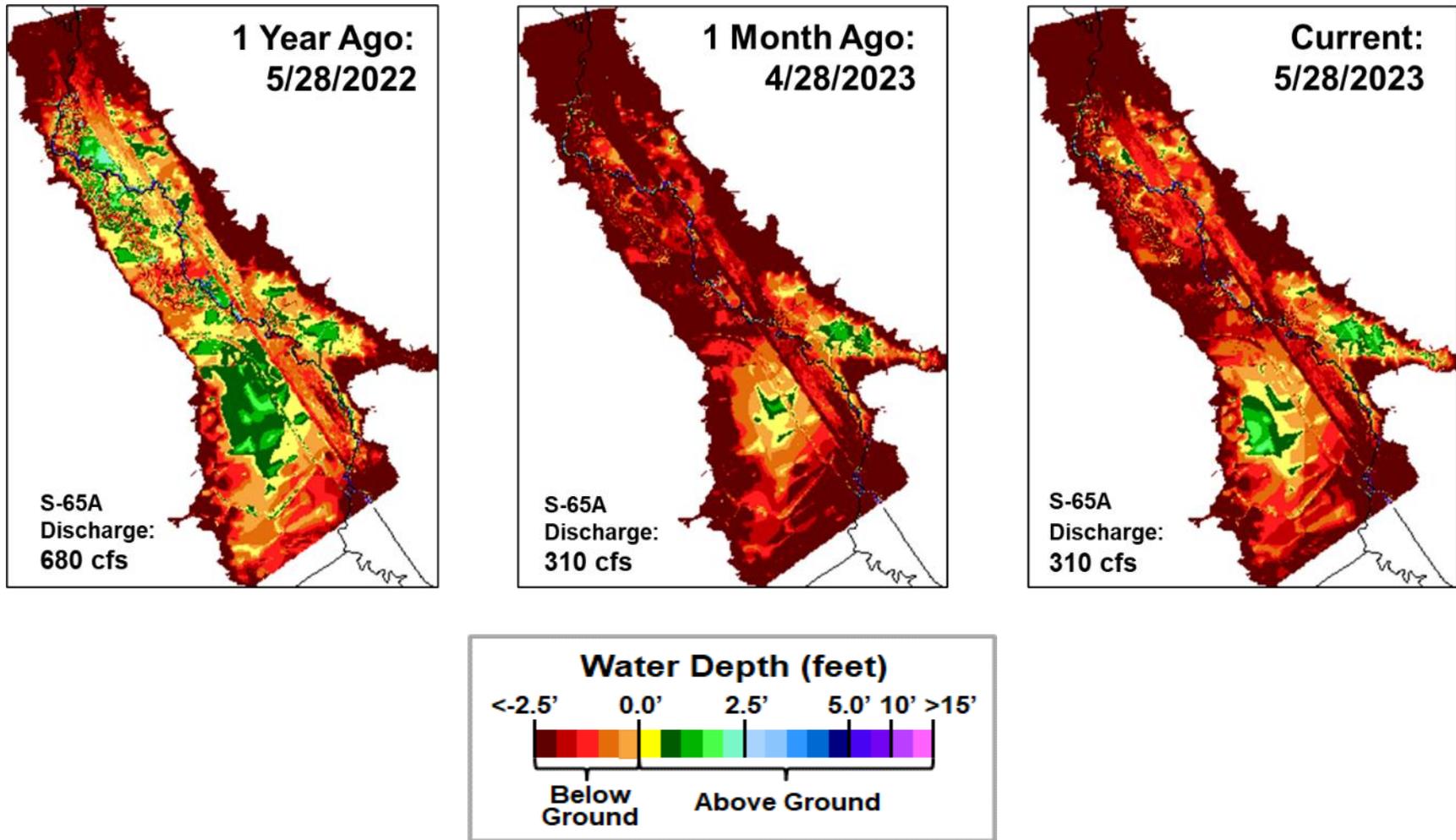
e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC33, PD62R and PD42R.

f. Mean of five river channel stations (PC62, KRDR02, KRBN, PC33, PC11) in the Phase I area.

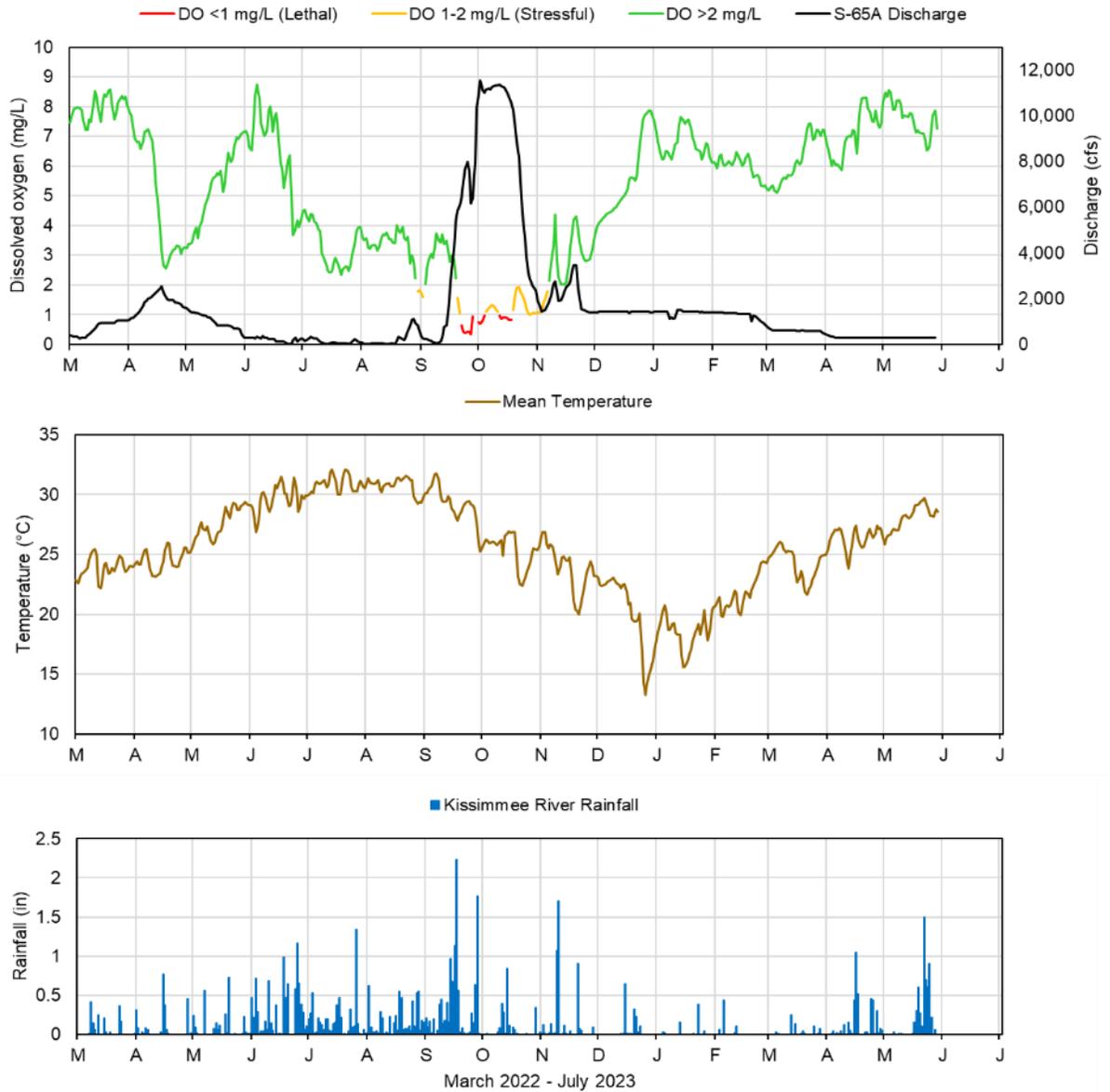
g. One-day spatial average obtained from the South Florida Water Depth Assessment Tool (SFWDAT).



**Figure KB-4.** Kissimmee River stage, discharge, and rainfall.



**Figure KB-5.** Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago, and current.



Report Date: 5/30/2023; data are through: 5/28/2023



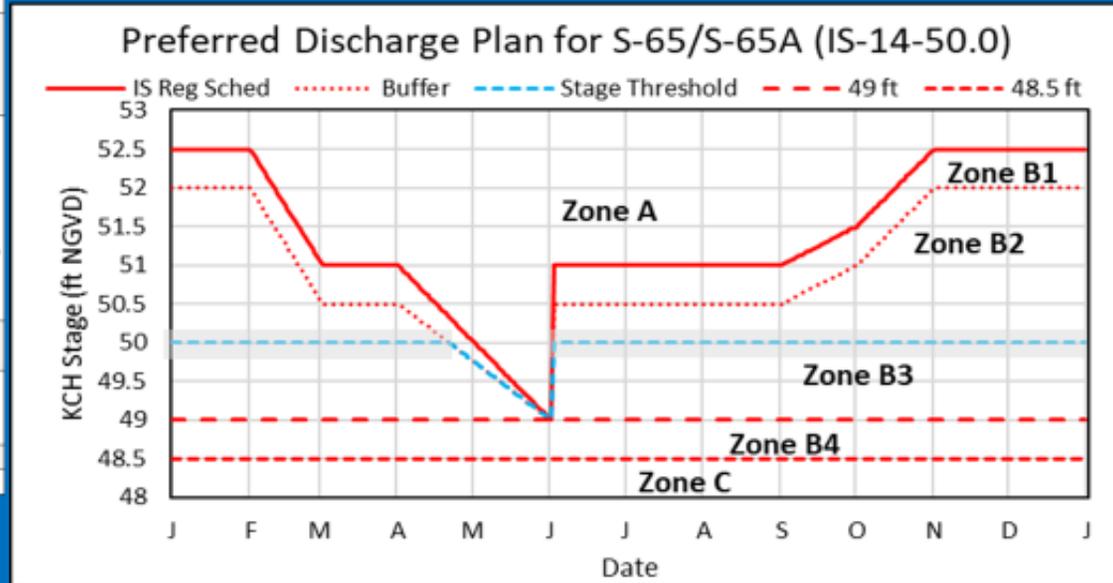
**Figure KB-6.** Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches). Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRDR02, KRBN, PC33, PC11, PD62R, and PD42R with an average of four stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.

Stage and Discharge Guidance for 2021-2023.		
Zone	KCH Stage (ft NGVD)	S-65/S-65A Discharge*
A	Above regulation schedule line.	Flood control releases as needed with no limits on the rate of discharge change.
B1	In flood control buffer zone (0.5 ft below the schedule line).	Adjust S-65 discharge so that S-65A discharge is between 1400 cfs at the buffer zone line and 3000 cfs at the schedule line.
B2	Between the Flood Control Buffer and the 50.0 ft line.	Adjust S-65 discharge to maintain at least 1400 cfs at S-65A. Use $\pm 0.2$ ft buffer (gray band) above and below the 50.0 ft line to decide when to begin ramping up to 1400 cfs or down to 300 cfs; do not continue reducing discharge if stage rises back to or above the threshold stage line.
B3	Between the 50.0 ft line and 49 ft.	Adjust S-65 discharge to maintain at least 300 cfs at S-65A.
B4	Between 48.5 ft to 49 ft.	Adjust S-65 discharge to maintain S-65A discharge between 0 cfs at 48.5 ft and 300 cfs at 49 ft.
C	Below 48.5 ft.	0 cfs.

\*Changes in discharge should not exceed limits in inset table below.

Table KB-3. Discharge Rate of Change Limits for S65/S65A (revised 1/14/19).		
Q (cfs)	Maximum rate of INCREASE (cfs/day)	Maximum rate of DECREASE (cfs/day)
0-300	100	-50
301-650	150	-75
651-1400	300	-150
1401-3000	600	-600
>3000	1000	-2000

## 2021-2023 Discharge Plan for S-65/S-65A



### Other Considerations

- When possible, limit lake ascension rate in the Jun 1 - Aug 15 window to 0.25 ft per 7 days in Lakes Kissimmee, Cypress, Hatchineha (S-65), East Toho (S-59) and Toho (S-61).
- If outlook is for extreme dry conditions meet with KB staff to discuss modifications to this plan.

Slide Revised 1/3/2022

**Figure KB-7.** IS-14-50 Discharge Plan for S65/S65A with discharge rate of change limits (revised 1/14/19).

## Lake Okeechobee

Lake Okeechobee stage was 13.90 feet NGVD on May 28, 2023, which is 0.18 feet higher than the previous week and 0.40 feet lower than a month ago (**Figure LO-1**). Lake stage remained in the Low sub-band (**Figure LO-2**) and was 0.80 feet above the upper limit of the ecological envelope (**Figure LO-3**). According to NEXRAD, 3.09 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) increased from 307 cfs the previous week to 1,091 cfs. Average daily outflows (excluding evapotranspiration) decreased from 2,983 cfs the previous week to 1,132 cfs. Most of the inflow came from the Indian Prairie Canals (506 cfs). Outflows to the west via the S-77 structure averaged 1,001 cfs for the week and outflows to the south via the S-350 structures averaged 86 cfs. There were no outflows to the east via the S-308 structure. **Figures LO-4 and LO-5** show the combined average daily inflows and outflows for the Lake over the past eight weeks, and average inflows and outflows last week, respectively. These data are provisional and are subject to change.

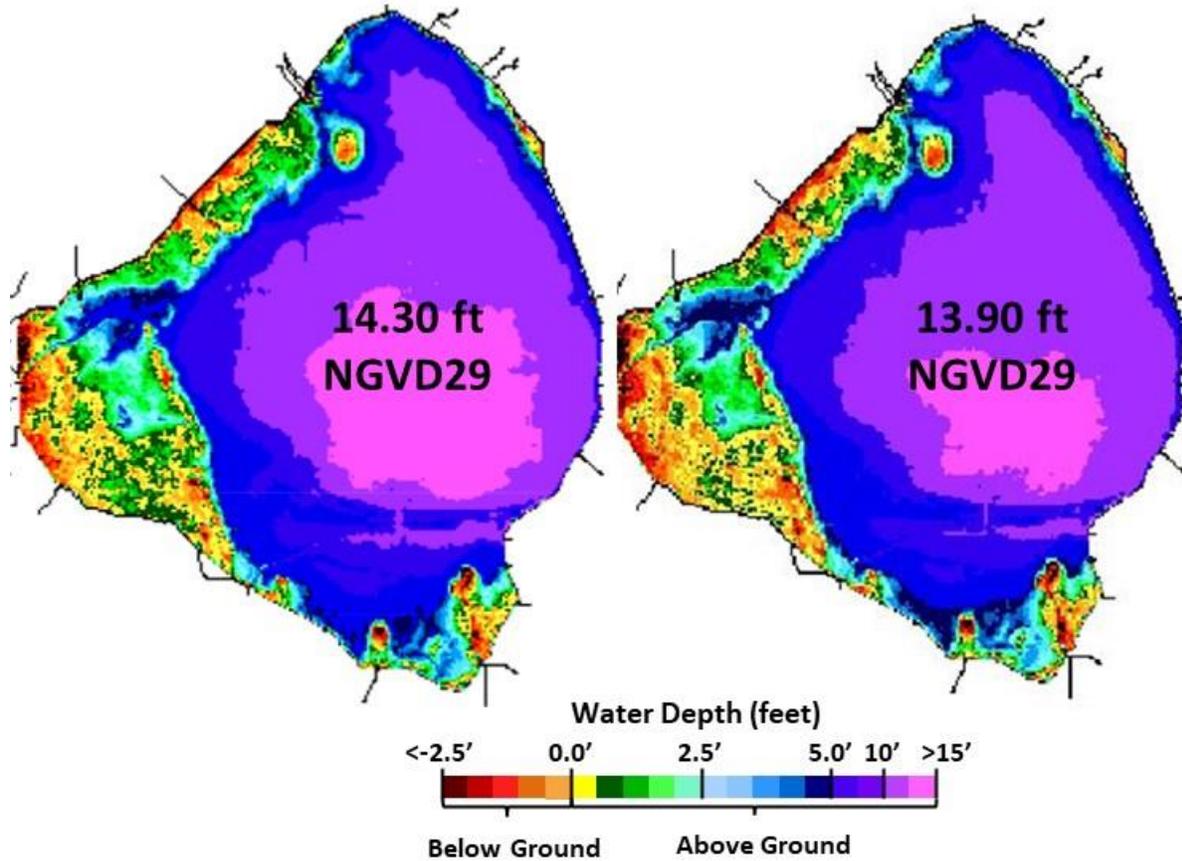
The most recent satellite image (May 27, 2023) from NOAA's Harmful Algal Bloom Monitoring System showed medium to high bloom potential in Fisheating Creek and nearshore areas of the Lake. Overall, bloom potential decreased compared to the previous week, especially in the southern part of the Lake (**Figure LO-6**).

The tenth foraging bird survey of the season was conducted on May 25, 2023. A total of 5,920 foraging birds were recorded on the Lake, which was significantly more than a month ago and above the five-year average (**Figure LO-7**).

# Changes in Water Depth

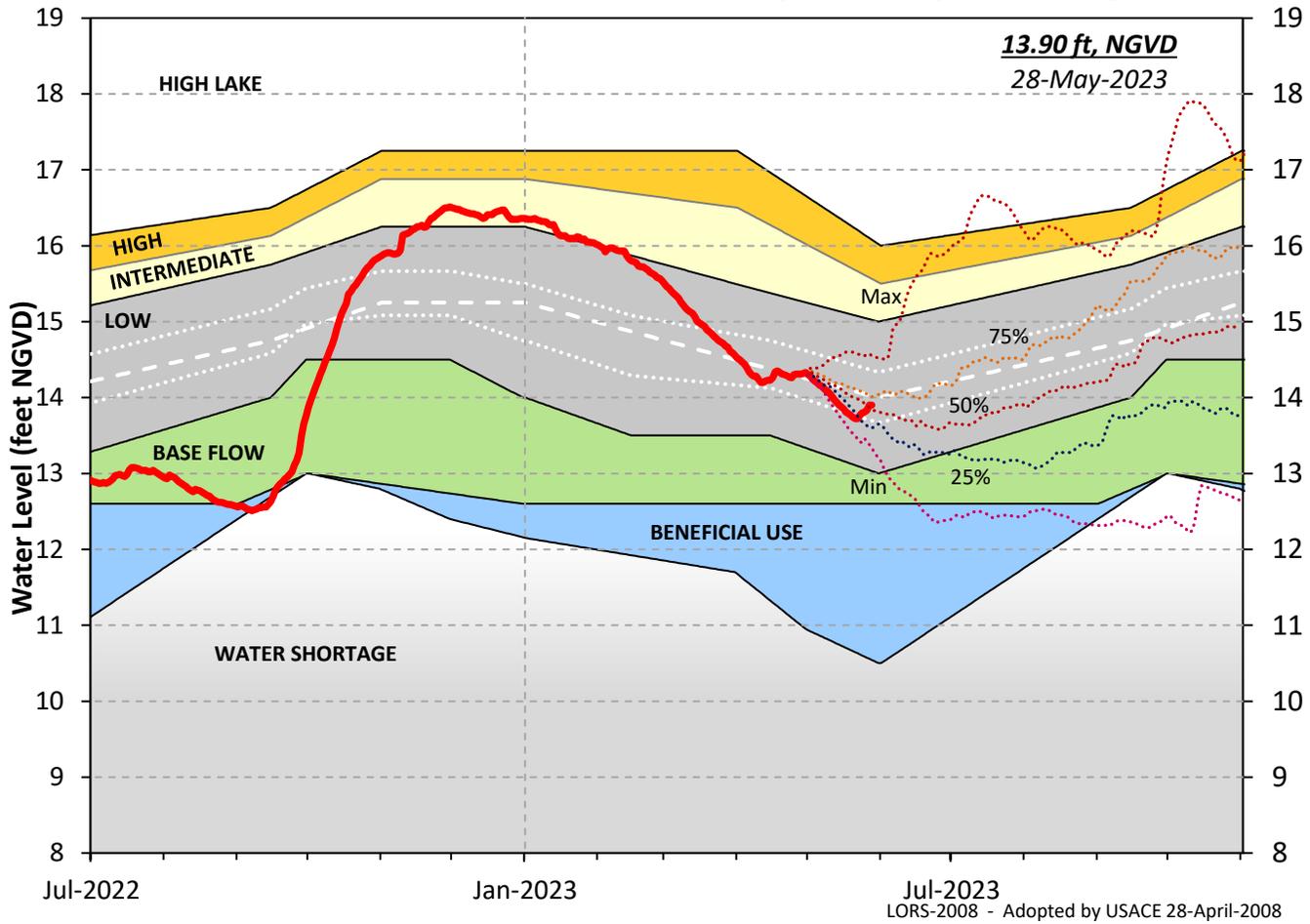
1 Month Ago:  
04/28/2023

Current:  
05/28/2023



**Figure LO-1.** Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

## Lake Okeechobee Water Level History and Projected Stages



**Figure LO-2.** Recent Lake Okeechobee stages with projected stages based on a dynamic position analysis.

## Lake Okeechobee Stage vs Ecological Envelope

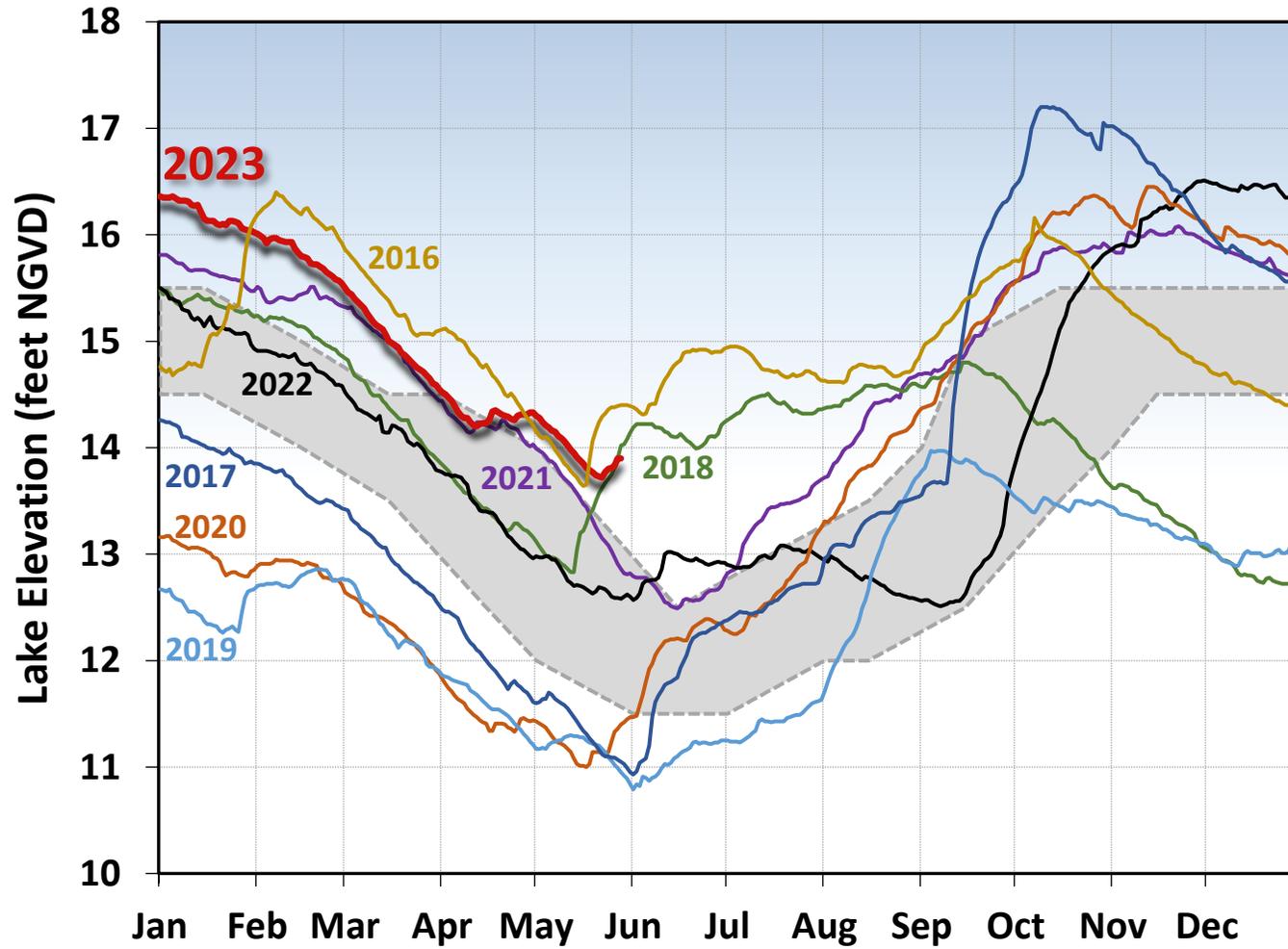
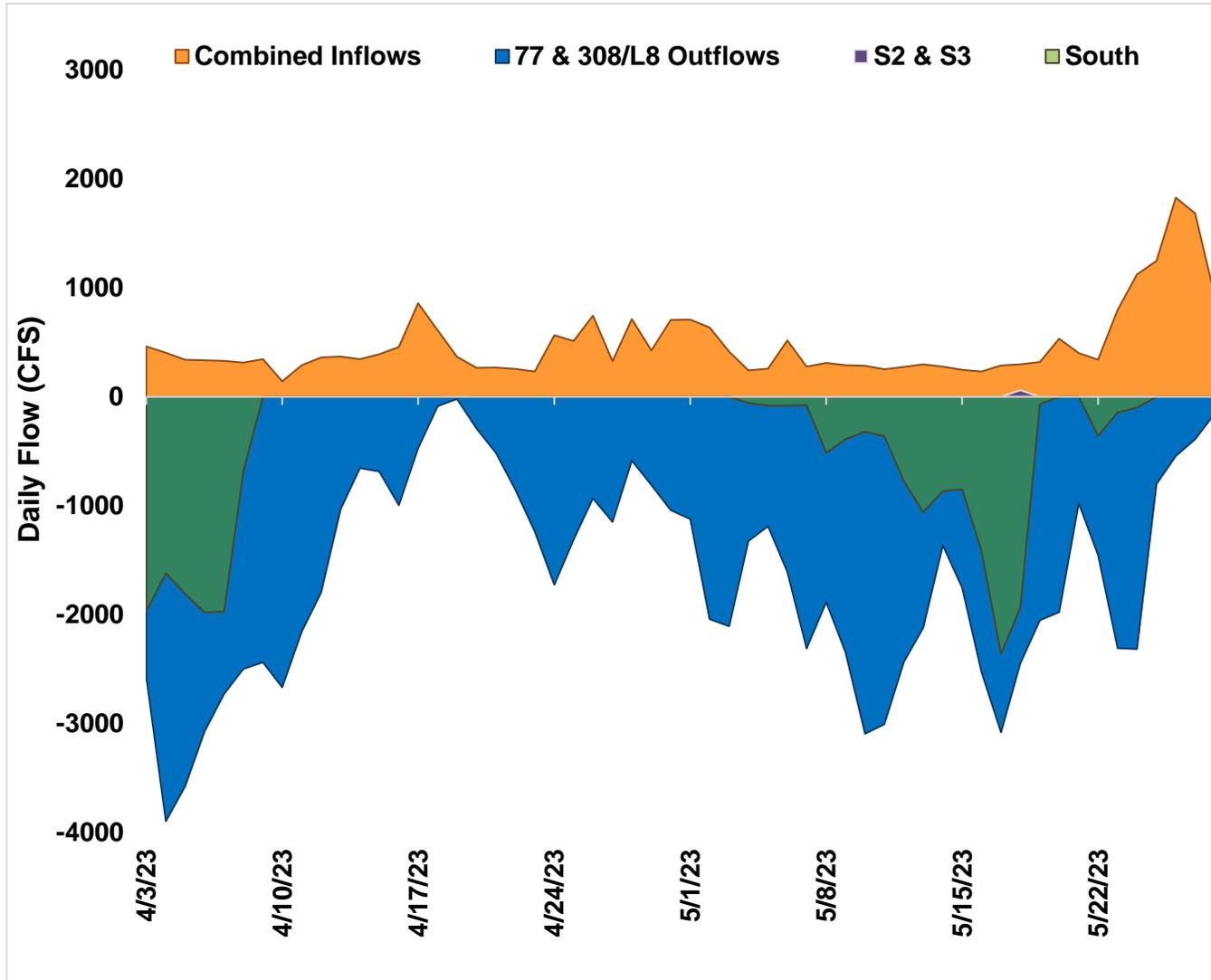
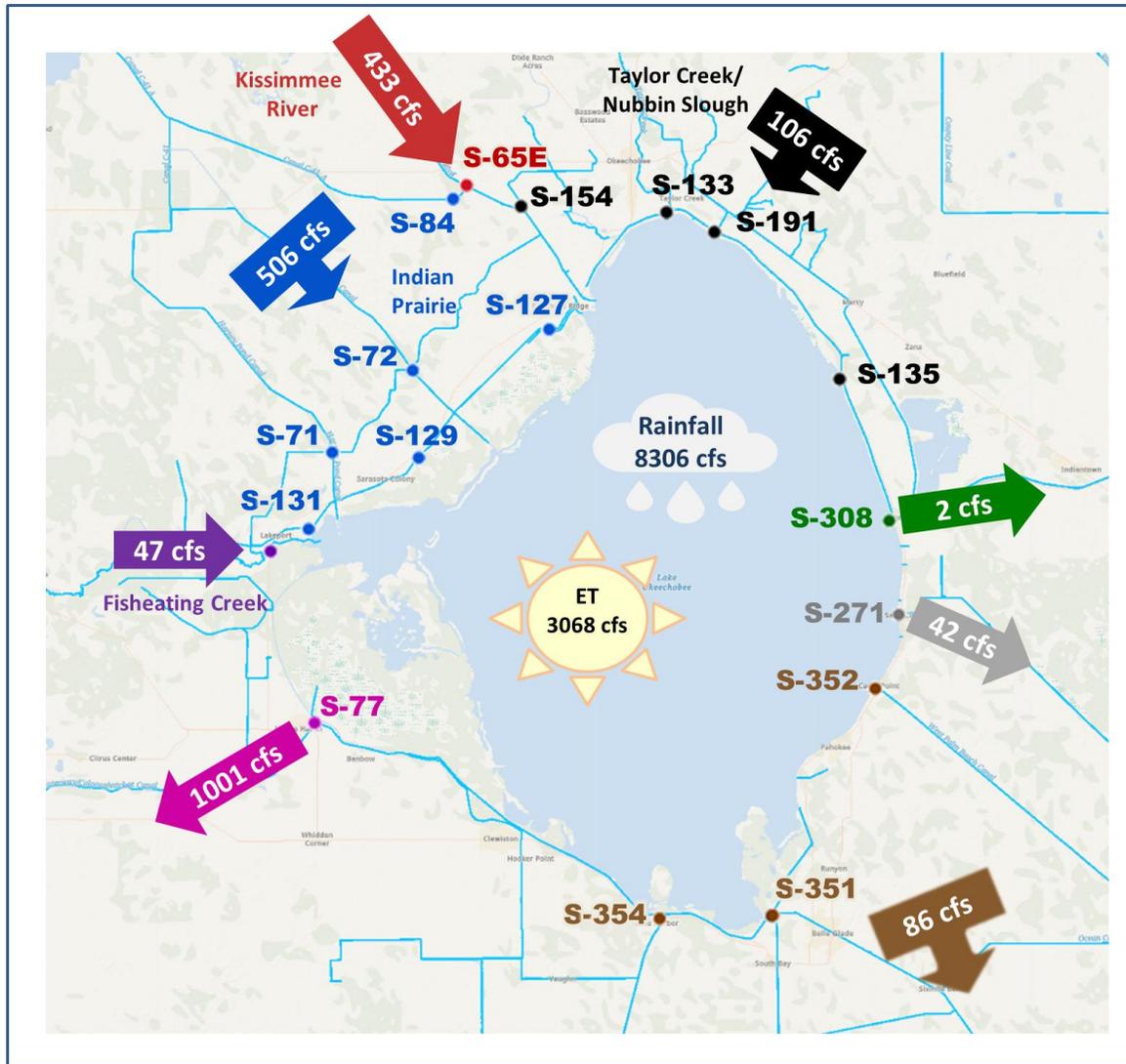


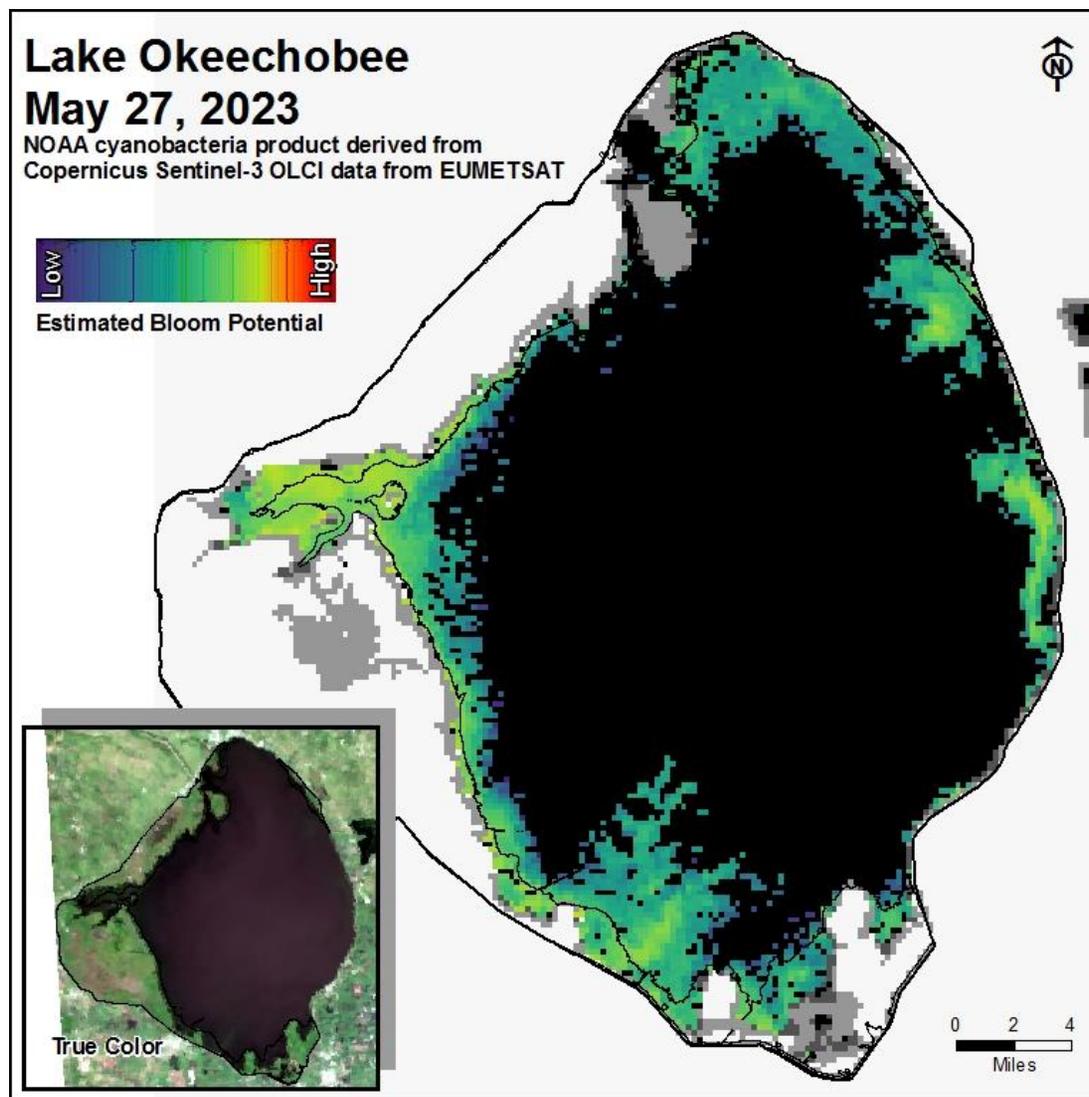
Figure LO-3. The prior seven years of annual stage hydrographs for Lake Okeechobee in comparison to the ecological envelope.



**Figure LO-4.** Major inflows (orange) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows from Lake Okeechobee into the L-8 or C-44 canals are included with outflows. Inflows are shown as positive values; outflows are negative. Outflows through the S-77 (Caloosahatchee) and S-308 (C-44 Canal) structures are based on downstream gauges to include flows to lock openings for navigation.

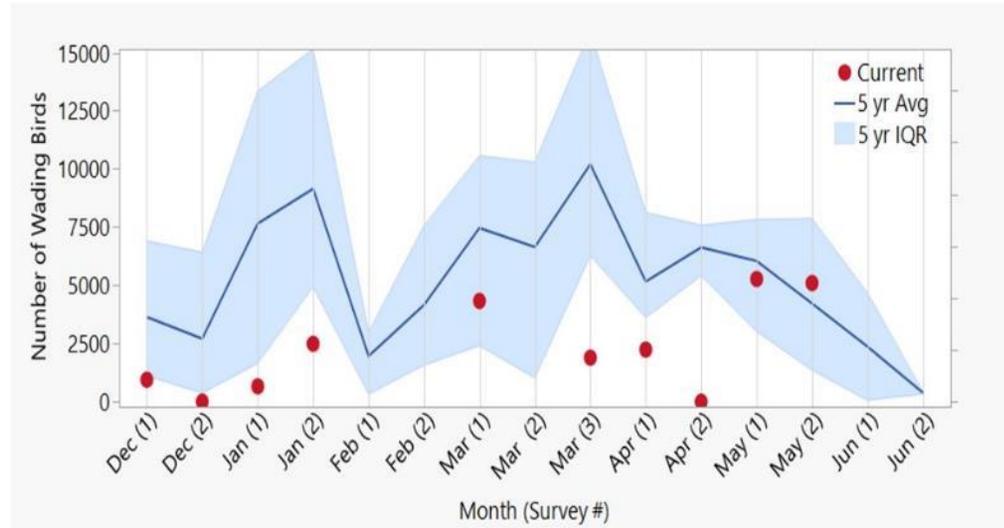
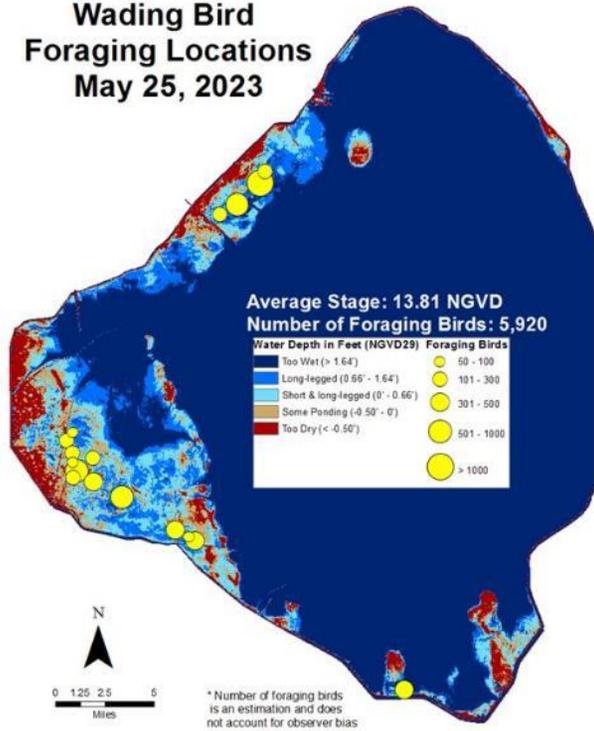


**Figure LO-5.** Inflows into Lake Okeechobee from Indian Prairie basins, Taylor Creek/Nubbin Slough, Kissimmee River and Fisheating Creek, and outflows to the west via S-77, to the east via S-308, to the south via S-351, S-352, S-354, and to southeast via S-271 (formerly Culvert 10A) for the week of May 22 - 28, 2023.



**Figure LO-6.** Cyanobacteria bloom potential on May 27, 2023, based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

**Wading Bird  
Foraging Locations  
May 25, 2023**



\*Provisional Data\*

**Figure LO-7.** Results from the Wading Bird surveys conducted on May 25, 2023. Image shows the location of flocks and the estimated total number of birds seen actively foraging on Lake Okeechobee. The graph shows changes in the total number of wading birds between January and May 2023 (red dots) compared to the five-year average (blue line).

## Estuaries

### *St. Lucie Estuary*

Over the past week, mean total inflow to the St. Lucie Estuary was 698 cfs (**Figures ES-1 and ES-2**), and the previous 30-day mean inflow was 527 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, surface salinities increased at the US1 Bridge and HR1 sites and remained the same at the A1A Bridge site (**Table ES-1 and Figure ES-3**). The seven-day moving average of the surface and bottom salinities at the US1 Bridge was 20.3. Salinity conditions in the middle estuary were estimated to be within the optimal range for adult eastern oysters (**Figure ES-4**). The mean larval oyster recruitment rate reported by the Fish and Wildlife Research Institute (FWRI) was 1.3 spat/shell for April, indicating the spawning season has begun (**Figure ES-5**).

### *Caloosahatchee River Estuary*

Over the past week, mean total inflow to the Caloosahatchee River Estuary was 1,853 cfs (**Figures ES-6 and ES-7**), and the previous 30-day mean inflow was 1,787 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-7**.

Over the past week, surface salinities increased at Cape Coral and Shell Point and decreased at the remaining sites in the estuary (**Table ES-2 and Figures ES-8 and ES-9**). The seven-day mean salinities (**Table ES-2**) were in the optimal range (0-10) for tape grass in the upper estuary. The seven-day mean salinity values were within the optimal range for adult eastern oysters at Cape Coral and in the stressed range at Shell Point and Sanibel (**Figure ES-10**). The mean larval oyster recruitment rate reported by the FWRI was 0.8 spat/shell at Iona Cove and 3.6 spat/shell at Bird Island for April, indicating the spawning season has begun (**Figures ES-11 and ES-12**).

Surface salinity at Val I-75 was forecasted for the next two weeks using an autoregression model (Qiu and Wan, 2013<sup>1</sup>) coupled with a linear reservoir model for the tidal basin. Model scenarios included pulse releases at S-79 ranging from 0 to 1,500 cfs, and a steady release at 2,000 cfs with estimated tidal basin inflows of 32 cfs. Model results from all scenarios predict daily salinity to be 2.1 or lower, and the 30-day moving average surface salinity to be 0.9 or lower at Val I-75 at the end of the two-week period (**Table ES-3 and Figure ES-13**). This keeps predicted salinities in the upper estuary within the optimal salinity range (0-10) for tape grass.

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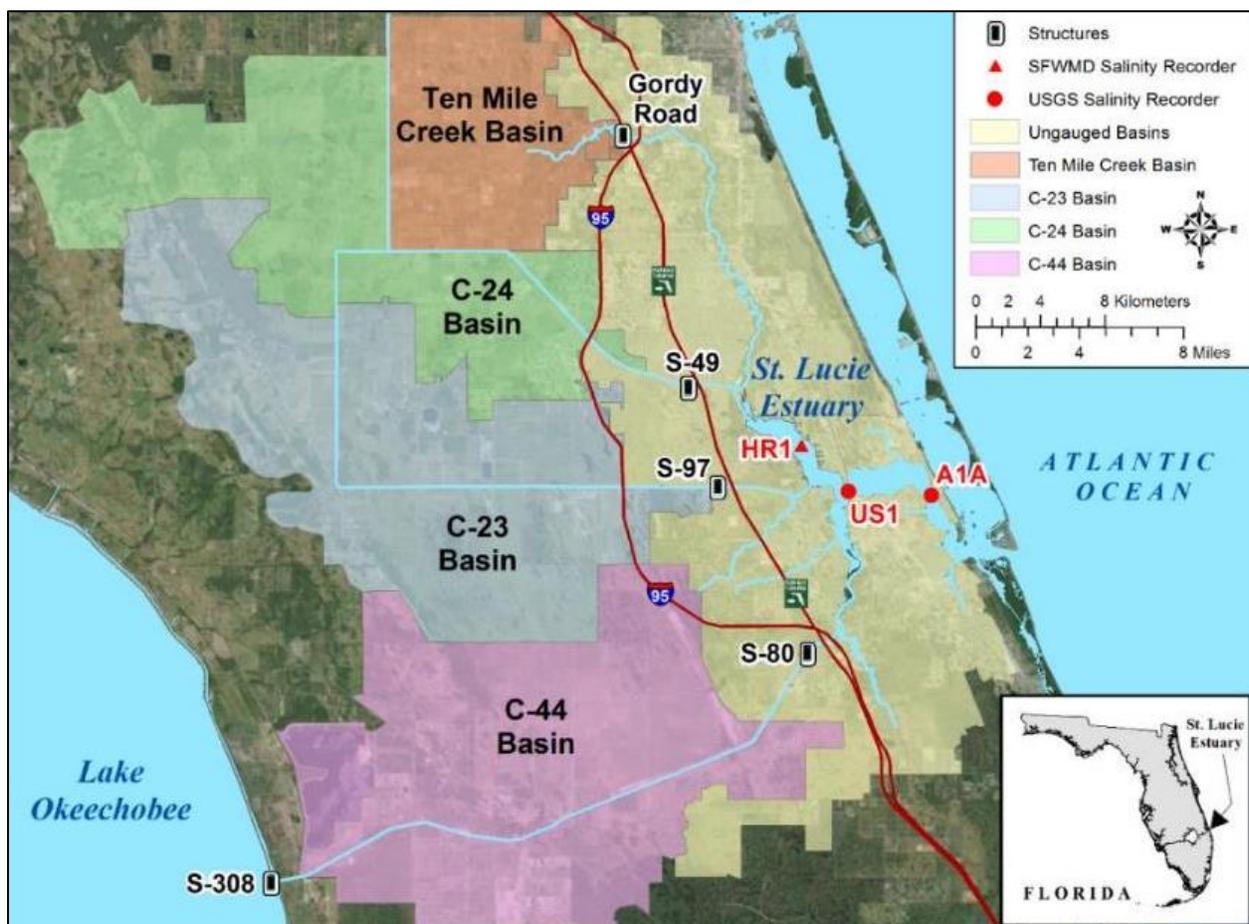
<sup>1</sup> Qiu, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

## Red Tide

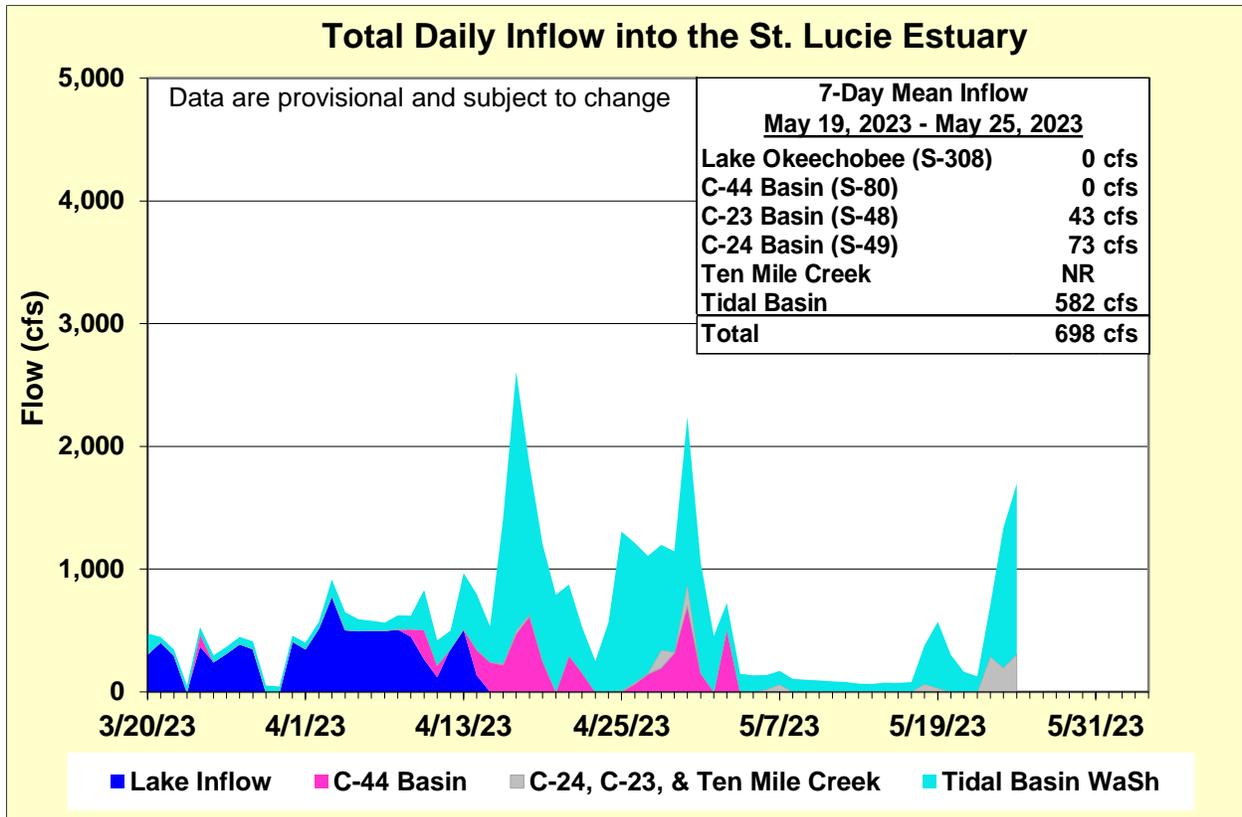
The Florida Fish and Wildlife Research Institute reported on May 26, 2023, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed at bloom concentrations in any samples collected within the District region. On the east coast, red tide was not observed in samples from St. Lucie, Martin, Palm Beach, or Miami-Dade counties.

## Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are normal. The LORS2008 release guidance suggests up to 3,000 cfs release at S-79 to the Caloosahatchee River Estuary and up to 1,170 cfs release at S-80 to the St. Lucie Estuary.



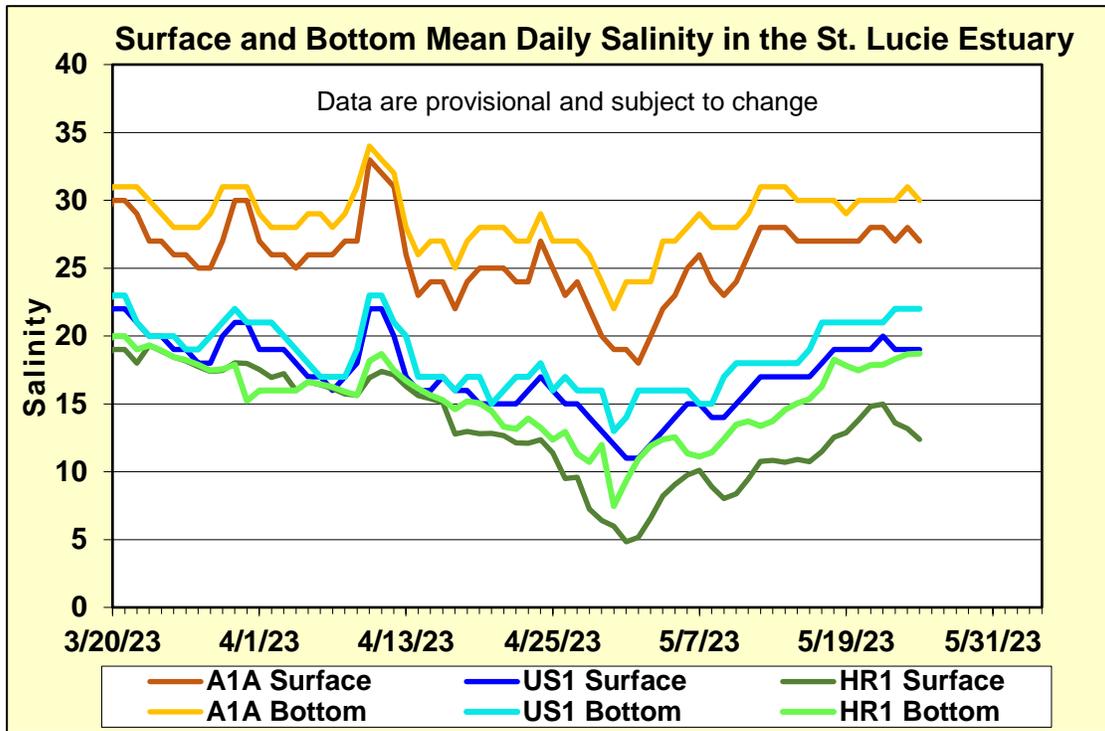
**Figure ES-1.** Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.



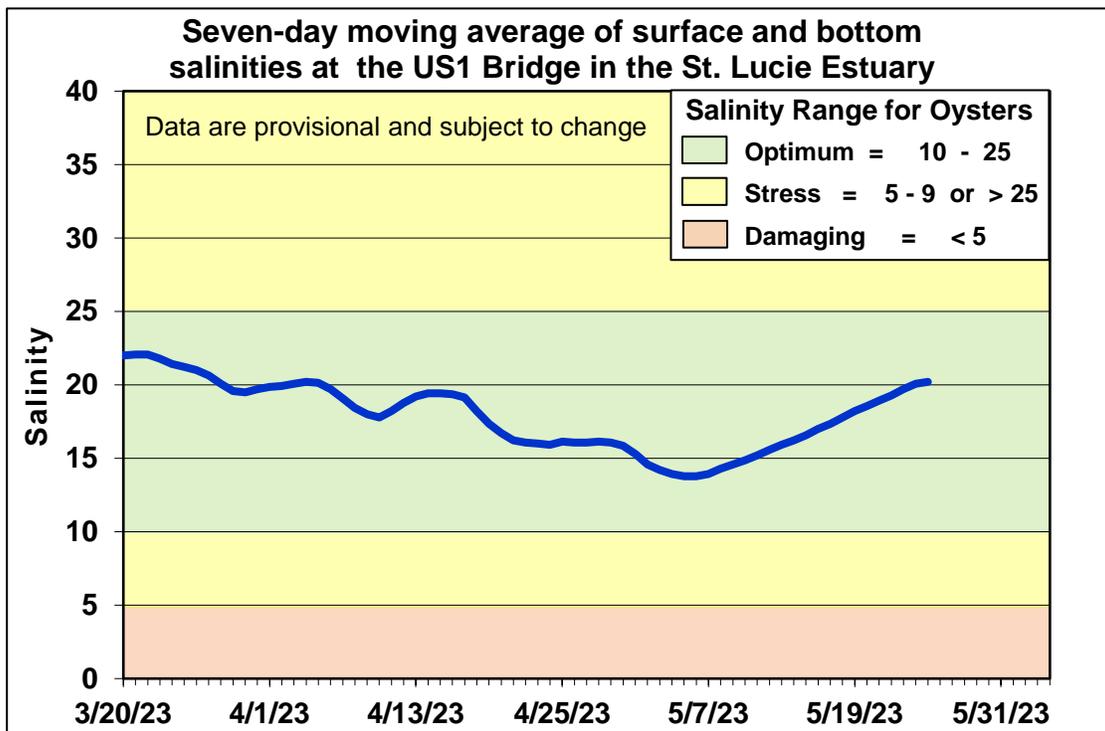
**Figure ES-2.** Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

**Table ES-1.** Seven-day mean salinity at oyster monitoring sites in the St. Lucie Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope reflects the optimum salinity range for adult eastern oysters (*Crassostrea virginica*) in the estuary. Data are provisional.

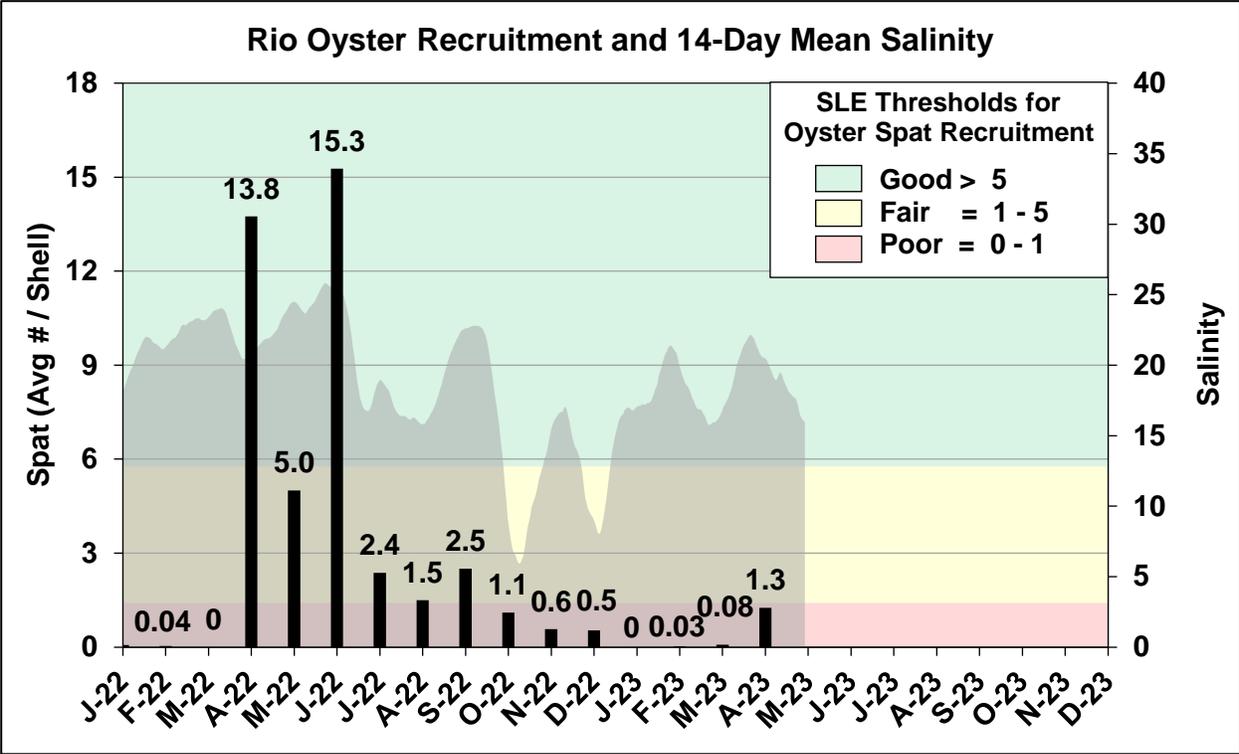
Sampling Site	Surface	Bottom	Optimum Envelope
HR1 (North Fork)	<b>13.7</b> (11.1)	<b>18.1</b> (15.2)	10.0 – 25.0
US1 Bridge	<b>19.1</b> (17.4)	<b>21.4</b> (19.0)	10.0 – 25.0
A1A Bridge	<b>27.4</b> (27.4)	<b>30.0</b> (30.4)	10.0 – 25.0



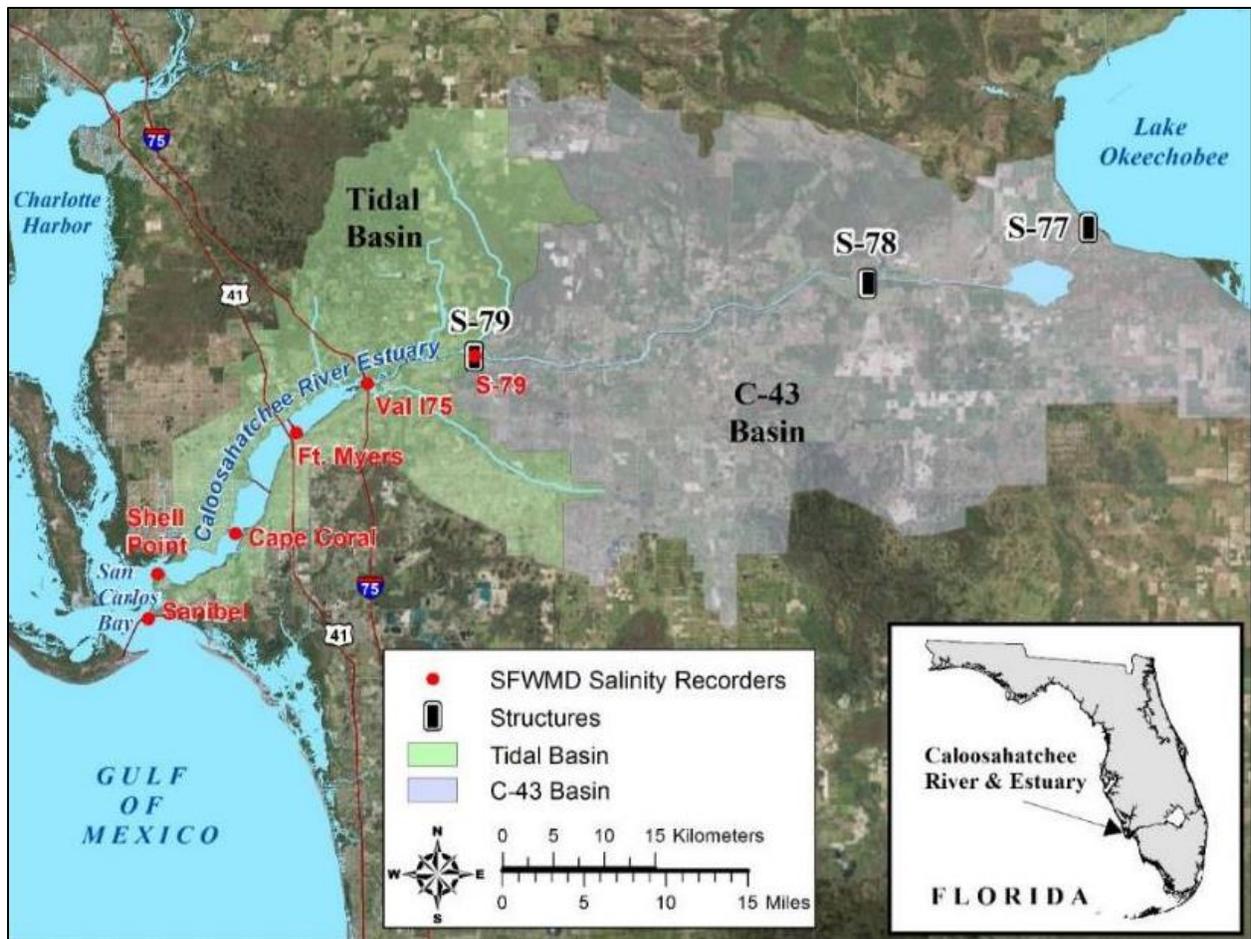
**Figure ES-3.** Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.



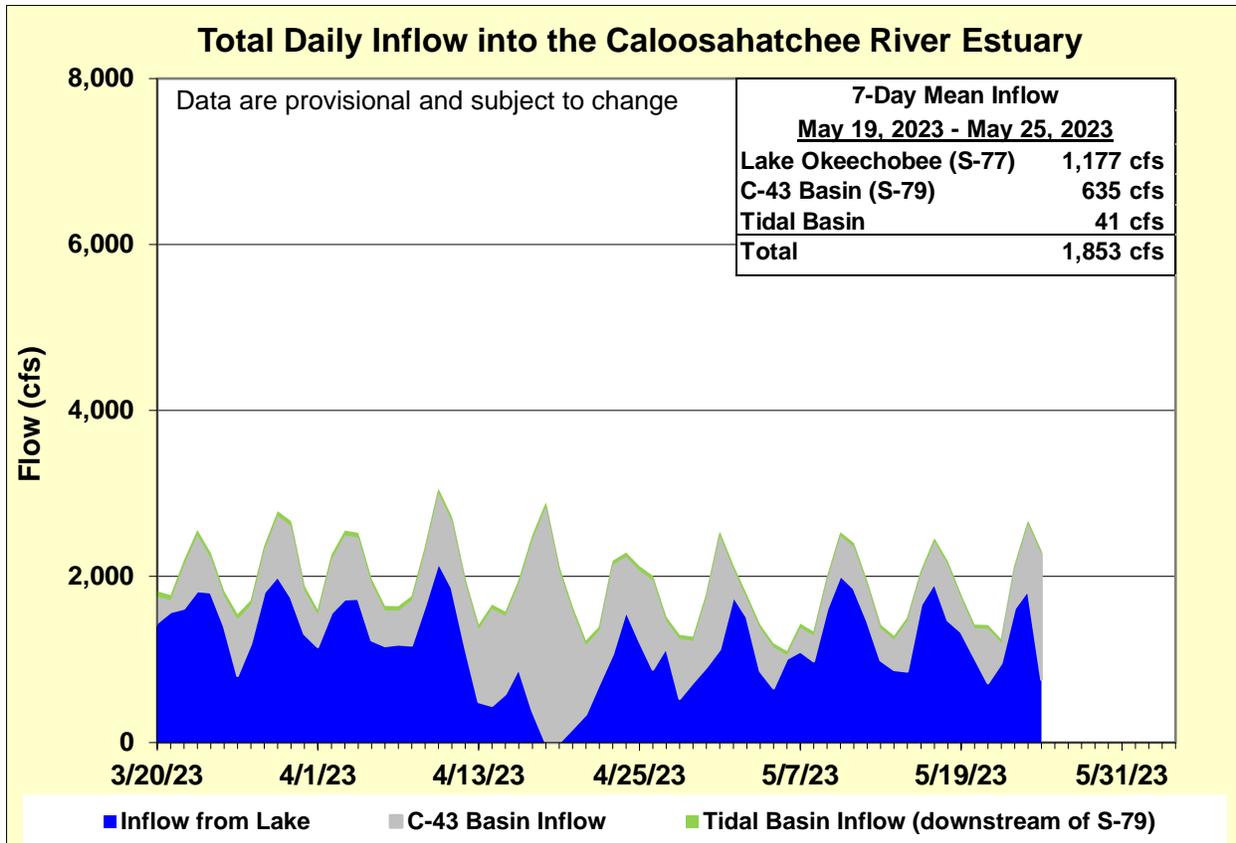
**Figure ES-4.** Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.



**Figure ES-5.** Mean oyster recruitment at the Rio oyster monitoring station and 14-day mean salinity at US1 Bridge.



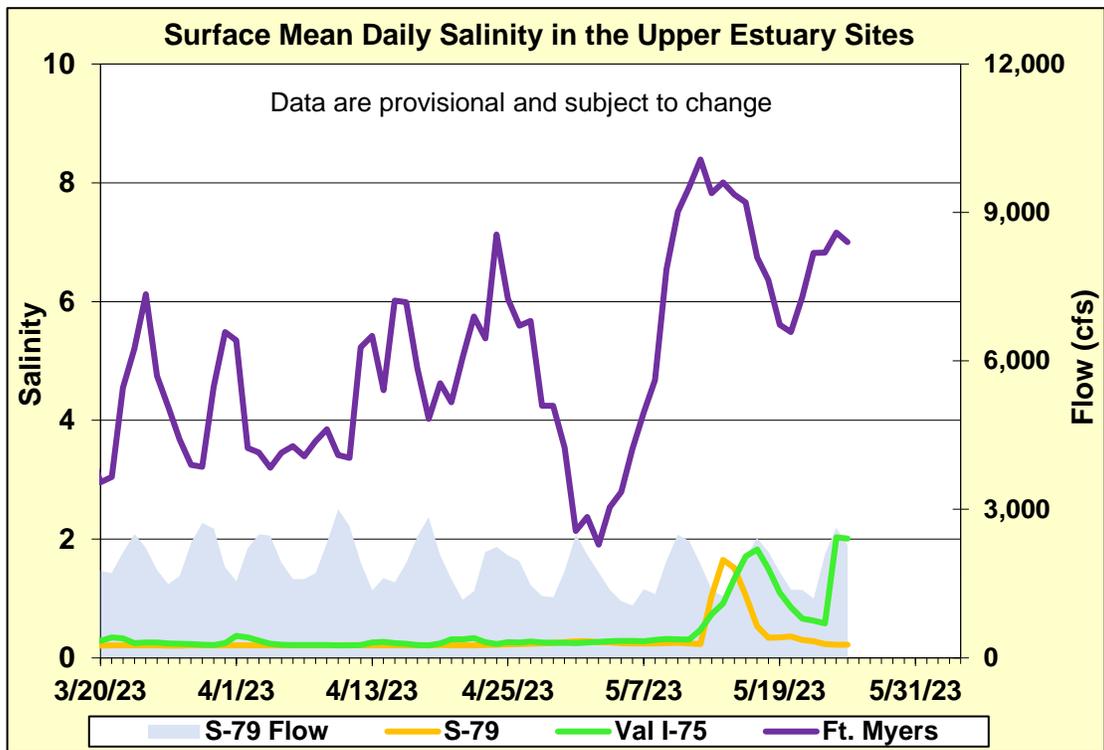
**Figure ES-6.** Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.



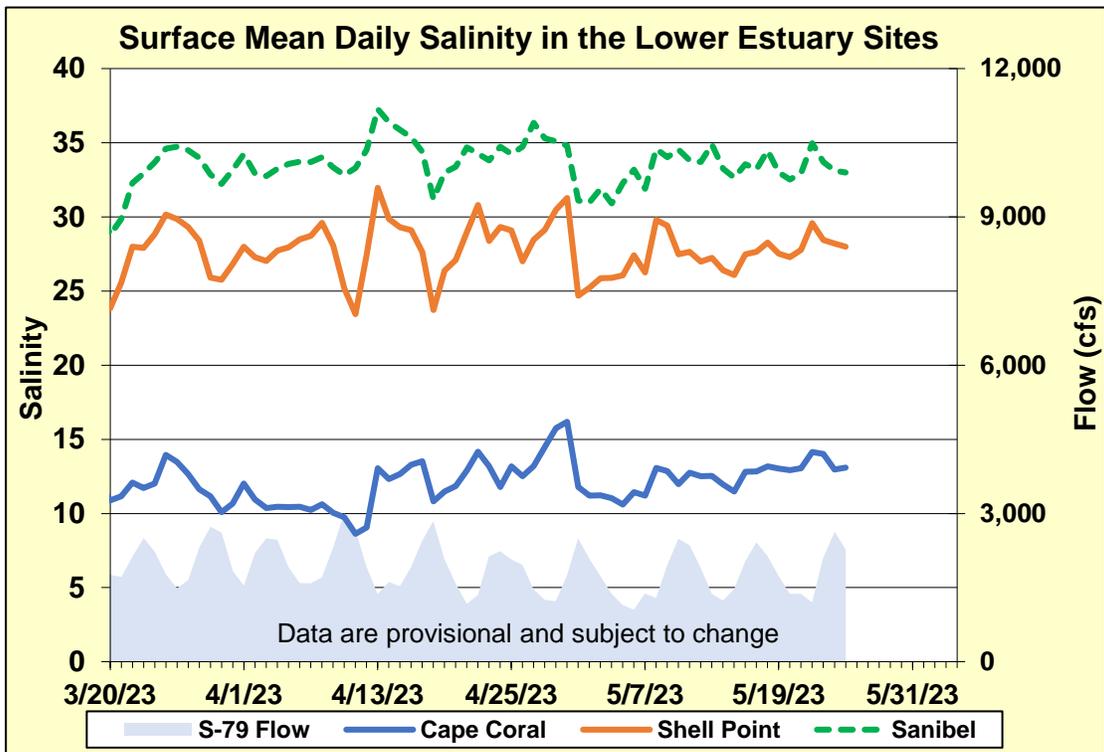
**Figure ES-7.** Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

**Table ES-2.** Seven-day mean salinity at six monitoring sites in the Caloosahatchee River Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope in the upper estuary sites is for the protection of tape grass and the envelope in the lower estuary is the optimum salinity range for adult eastern oysters (*Crassostrea virginica*). Data are provisional.

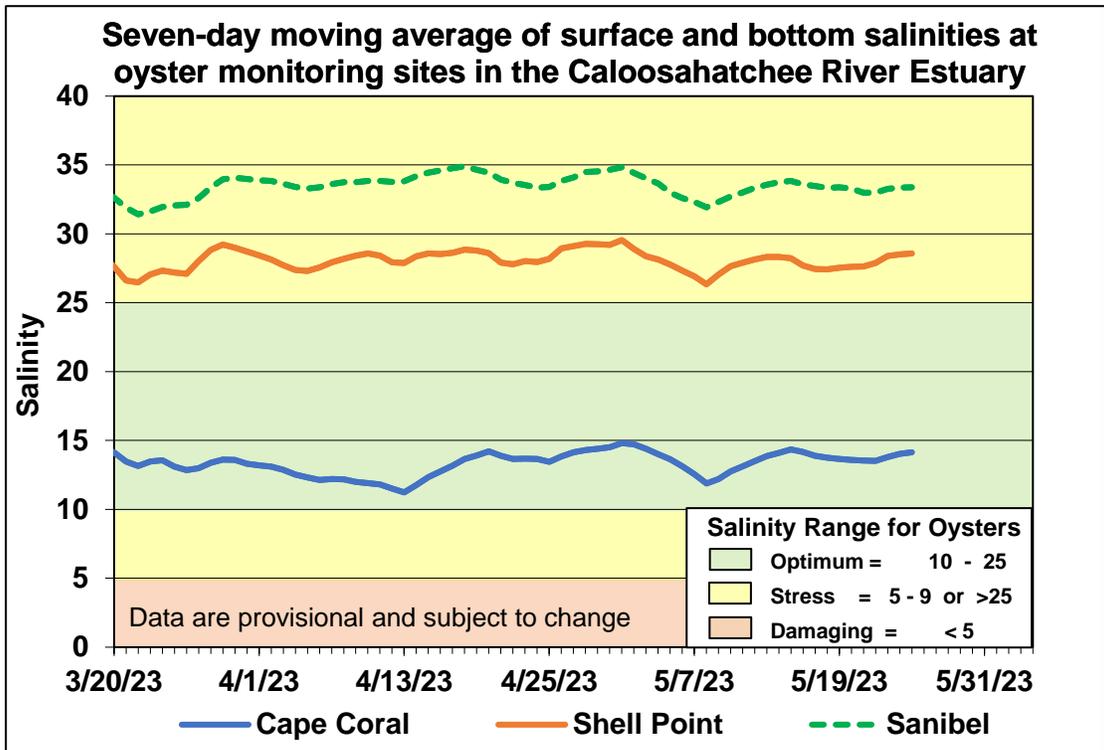
Sampling Site	Surface	Bottom	Optimum Envelope
S-79 (Franklin Lock)	<b>0.3</b> (0.9)	<b>0.3</b> (0.9)	0.0 – 10.0
Val I-75	<b>1.1</b> (1.2)	<b>1.3</b> (2.1)	0.0 – 10.0
Fort Myers Yacht Basin	<b>6.4</b> (7.5)	<b>7.9</b> (8.7)	0.0 – 10.0
Cape Coral	<b>13.3</b> (12.5)	<b>15.3</b> (14.8)	10.0 – 25.0
Shell Point	<b>28.1</b> (27.2)	<b>28.8</b> (27.9)	10.0 – 25.0
Sanibel	<b>33.3</b> (33.7)	<b>33.2</b> (33.1)	10.0 – 25.0



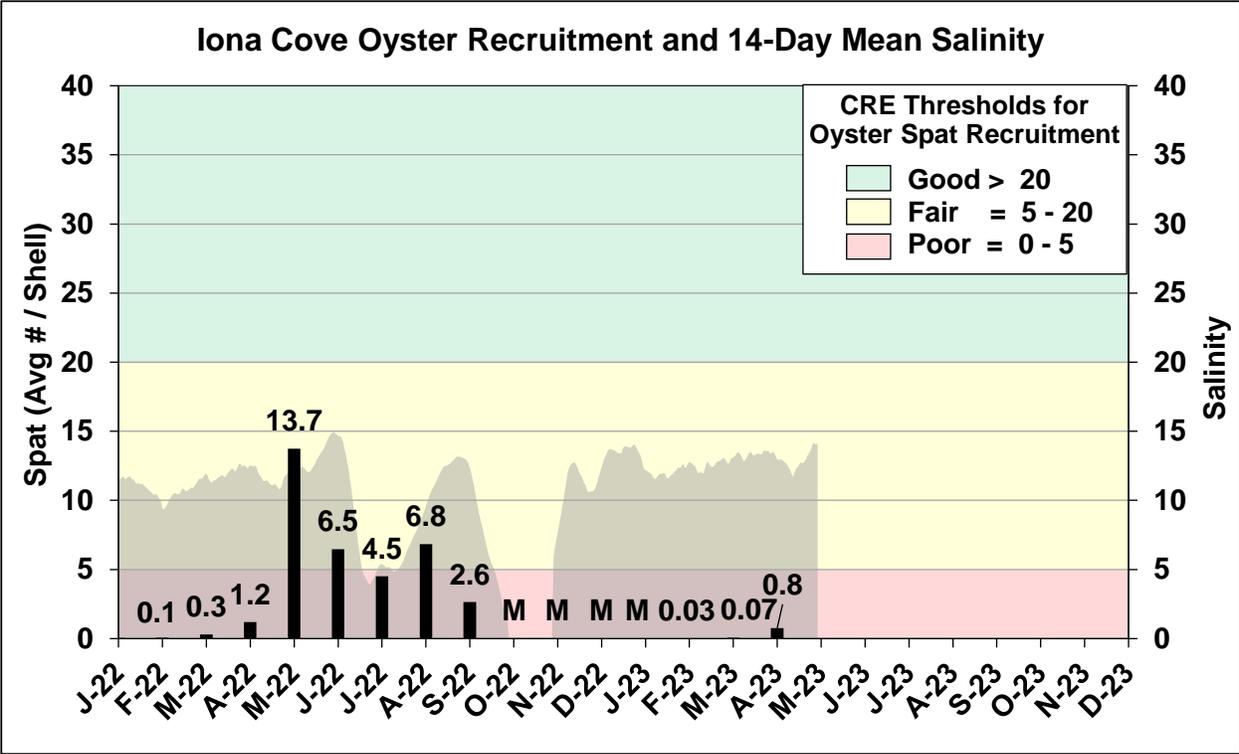
**Figure ES-8.** Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



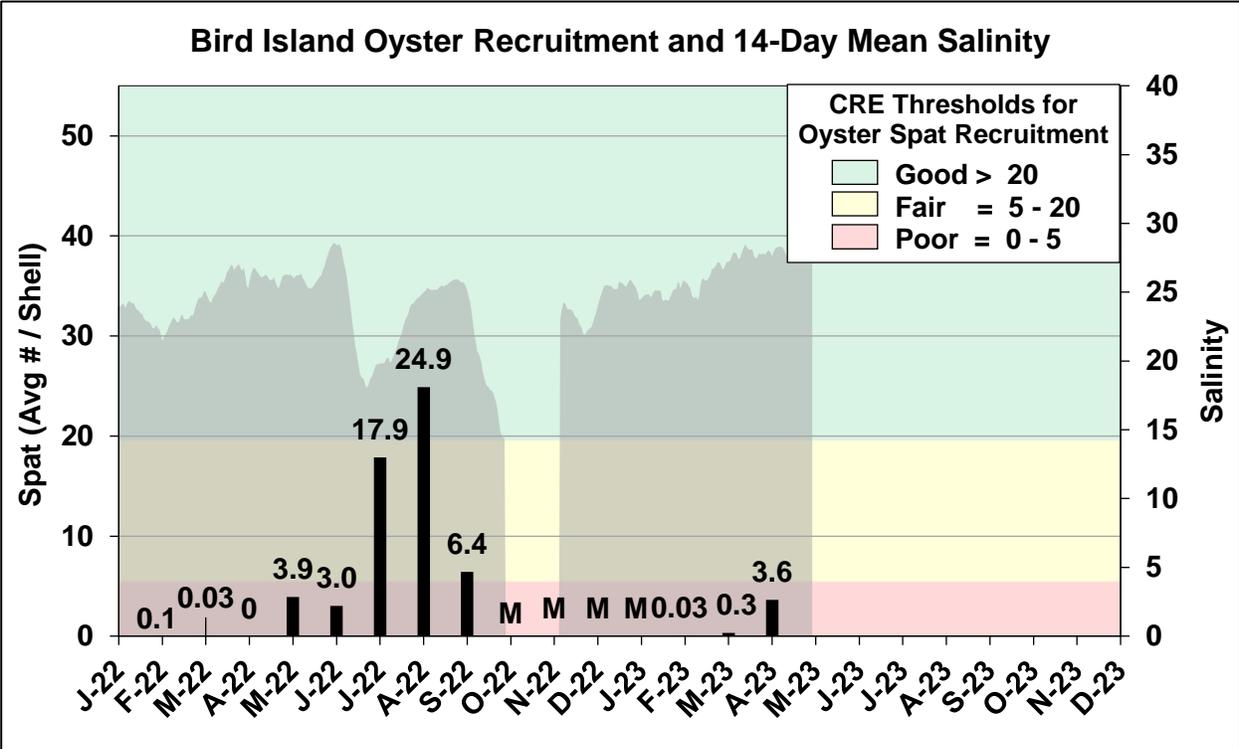
**Figure ES-9.** Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



**Figure ES-10.** Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.



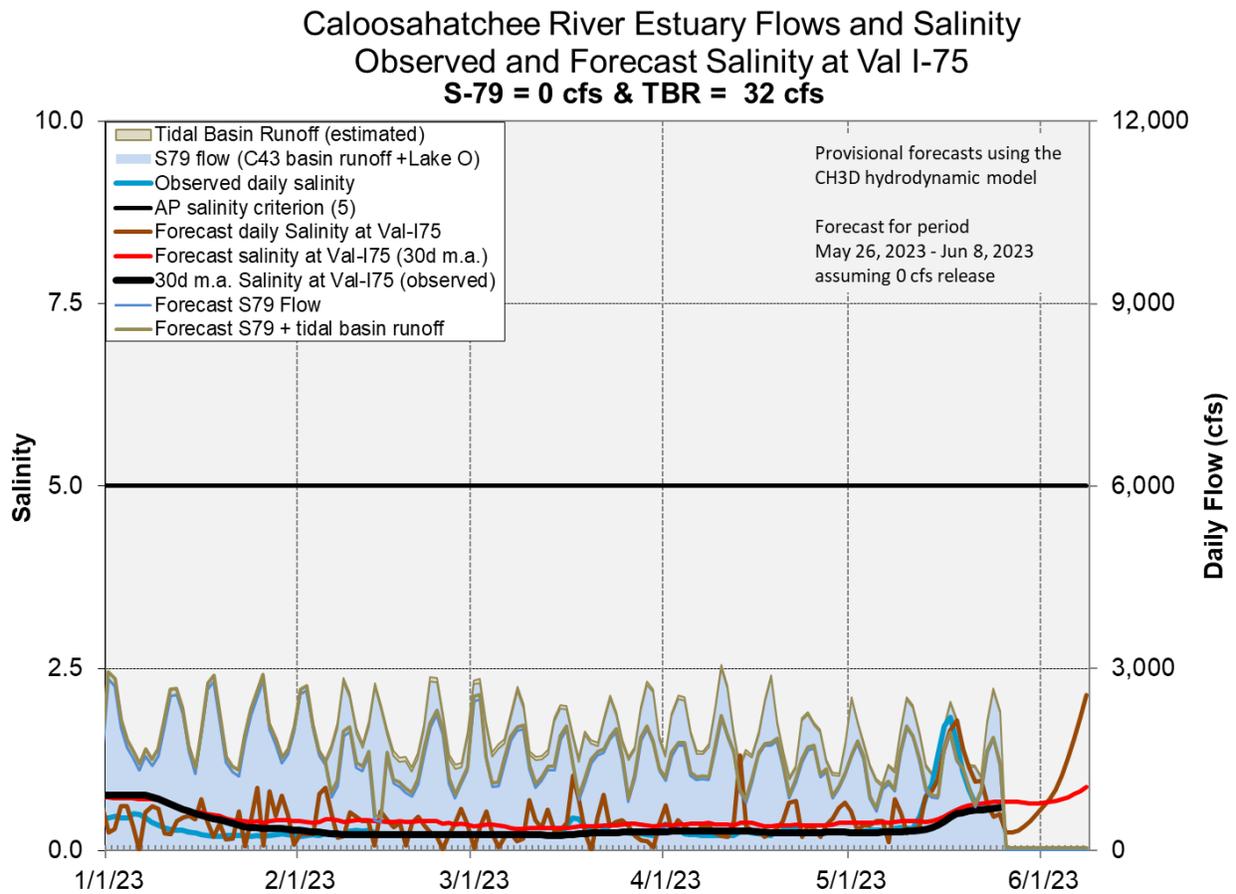
**Figure ES-11.** Mean oyster recruitment at the Iona Cove oyster monitoring station and 14-day mean salinity at Cape Coral.



**Figure ES-12.** Mean oyster recruitment at the Bird Island oyster monitoring station and 14-day mean salinity at Shell Point.

**Table ES-3.** Predicted salinity at Val I-75 in the Caloosahatchee River Estuary at the end of the forecast period for various S-79 flow release scenarios.

Scenario	Simulated S-79 Flow (cfs)	Tidal Basin Runoff (cfs)	Daily Salinity	30-Day Mean Salinity
A	0	32	2.1	0.9
B	450	32	1.2	0.7
C	750	32	0.7	0.7
D	1,000	32	0.4	0.6
E	1,500	32	0.3	0.6
F	2,000	32	0.3	0.6



**Figure ES-13.** Forecasted Val I-75 site surface salinity assuming no pulse release at S-79.

## Stormwater Treatment Areas

**STA-1E:** STA-1E Western Flow-way is offline for post-construction vegetation grow in and the Central Flow-way is offline for a Refurbishments project survey. Operational restrictions are in place in STA-1E Eastern Flow-way for vegetation management activities. The Central Flow-way contains nests of Migratory Bird Treaty Act protected species. Online treatment cells are at or near target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day phosphorus loading rate (PLR) for the Eastern Flow-way is below 1.0 g/m<sup>2</sup>/year. The 365-day PLR for the Central Flow-way is high (**Figure S-1**).

**STA-1W:** Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways for vegetation management activities. The Northern Flow-way and Cell 8, contain nests of Migratory Bird Treaty Act protected species. Treatment cells are at target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLR for the Eastern Flow-way is below 1.0 g/m<sup>2</sup>/year. The 365-day PLRs for the Northern and Western Flow-way are high (**Figure S-2**).

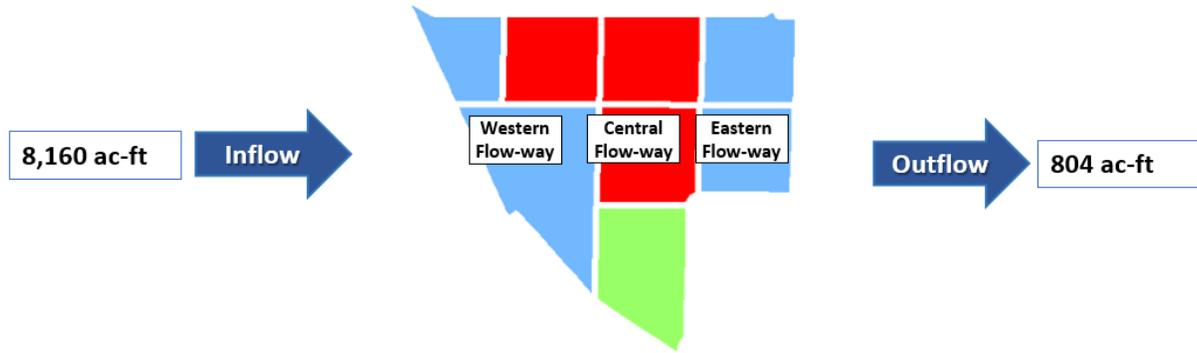
**STA-2:** STA-2 Flow-way 2 is offline for post-construction vegetation grow in. Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities. Flow-way 3 contains nests of Migratory Bird Treaty Act protected species. Online treatment cells are at or near target stage. Vegetation in Flow-ways 1 and 3 is stressed, and in Flow-ways 2, 4, and 5 is highly stressed. The 365-day PLRs for Flow-ways 4 and 5 are below 1.0 g/m<sup>2</sup>/year. The 365-day PLR for Flow-ways 1 and 3 are high (**Figure S-3**).

**STA-3/4:** STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Online treatment cells are at or above target stage. Vegetation in the Eastern and Central Flow-ways is highly stressed and in the Western Flow-way is stressed. The 365-day PLRs for the Central and Western Flow-ways are below 1.0 g/m<sup>2</sup>/year (**Figure S-4**).

**STA-5/6:** All flow-ways in STA-5/6 are online. Most treatment cells are below target stage. Flow-way 2 and 6 contain nests of Migratory Bird Treaty Act protected species. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8, which are healthy. The 365-day PLRs for most flow-ways are at or below 1.0 g/m<sup>2</sup>/year, except Flow-ways 3 which is high (**Figure S-5** and **S-6**).

For definitions on STA operational language see glossary following figures.

STA-1E Weekly Status Report – 5/22/2023 through 5/28/2023



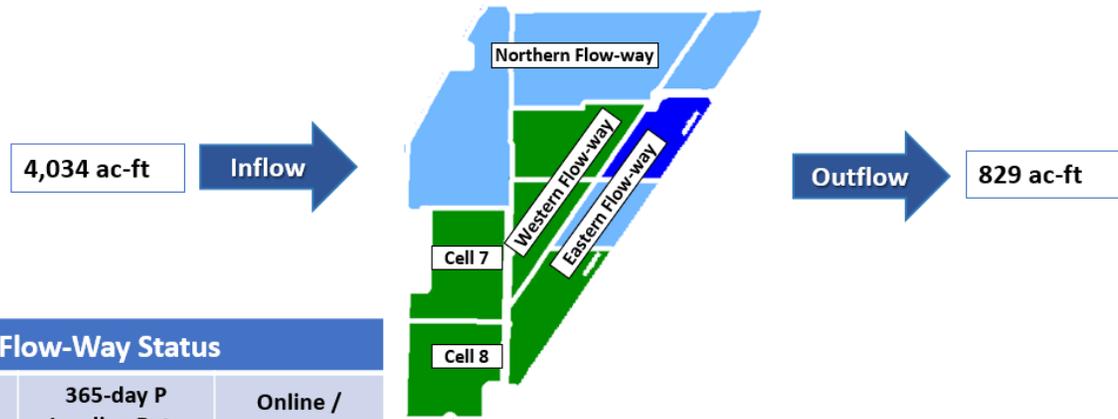
STA-1E Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
Eastern			Vegetation management
Central	Offline, refurbishments project survey starting 4/26/2023		
Western	Offline, post-construction grow in starting 3/28/2022		

As of 5/28/2023	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	0.2' – 0.5' below TS
	0.5' – 1.0' below TS
	Low Water Level (1.0' – 1.2' below TS)
	Extreme Low Water (> 1.2' below TS)

STA-1E Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	8,160	9,965	127,818
--Lake Inflow, ac-ft	0	N/A	1,500
Total Outflow, ac-ft	804	1,993	98,978
Inflow Conc., ppb	61	69	113
Outflow Conc., ppb	32	31	26
Includes Preliminary Data			

Figure S-1. STA-1E Weekly Status Report

STA-1W Weekly Status Report – 5/22/2023 through 5/28/2023



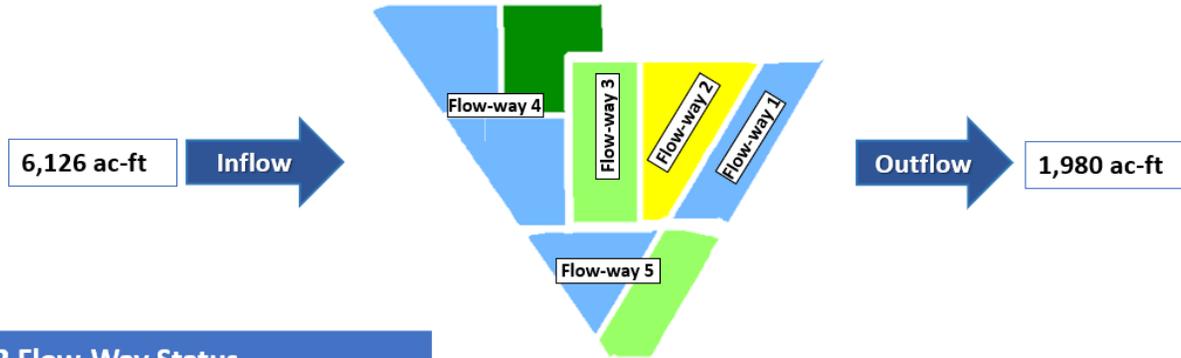
STA-1W Flow-Way Status			
Flow-Way	Vegetation Status <small>Healthy --- Stressed</small>	365-day P Loading Rate <small>(below 1.0 g P /m<sup>2</sup>/yr is optimal)</small>	Online / Offline / Restrictions
Northern	←  →	1.0	Vegetation management / Avian Nesting
Western	←  →	1.0	Vegetation management
Eastern	←  →	1.0	Vegetation management
Cell 7	←  →	N/A	Online
Cell 8	←  →	N/A	Construction / Avian Nesting

As of 5/28/2023	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	0.2' – 0.5' below TS
	0.5' – 1.0' below TS
	Low Water Level (1.0' – 1.2' below TS)
	Extreme Low Water (> 1.2' below TS)

STA-1W Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	4,034	6,278	157,542
--Lake Inflow, ac-ft	0	N/A	9,400
Total Outflow, ac-ft	829	5,277	163,642
Inflow Conc., ppb	127	135	197
Outflow Conc., ppb	18	20	20
Includes Preliminary Data			

Figure S-2. STA-1W Weekly Status Report

STA-2 Weekly Status Report – 5/22/2023 through 5/28/2023



STA-2 Flow-Way Status

Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1	← Healthy →	1.0	Online
2	Offline, post-construction grow in starting 1/23/2023		
3	← Healthy →	1.0	Veg Rehab / Avian nesting
4	← Stressed →	1.0	Vegetation Rehab
5	← Healthy →	1.0	Online

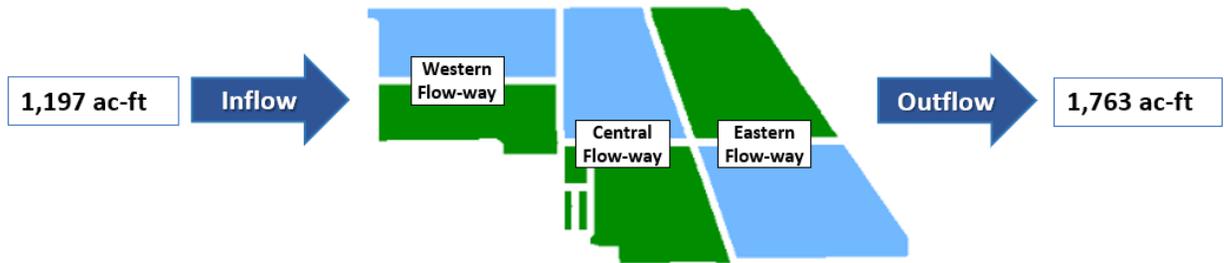
As of 5/28/2023	
Stage Based: Relative to Target Stage (TS)	
Deep Water Level (> 2.8' above TS)	Dark Purple
High Water Level (1.5' – 2.8' above TS)	Blue
0.2' – 1.5' above TS	Light Blue
Target Stage (TS +/- 0.2')	Green
0.2' – 0.5' below TS	Light Green
0.5' – 1.0' below TS	Yellow
Low Water Level (1.0' – 1.2' below TS)	Orange
Extreme Low Water (> 1.2' below TS)	Red

STA-2 Flow & Phosphorus Concentration

	7-day	28-day	365-day
Total Inflow, ac-ft	6,126	16,819	321,092
--Lake Inflow, ac-ft	200	N/A	21,400
Total Outflow, ac-ft	1,980	13,012	340,358
Inflow Conc., ppb	28	41	113
Outflow Conc., ppb	12	12	29
Includes Preliminary Data			

Figure S-3. STA-2 Weekly Status Report

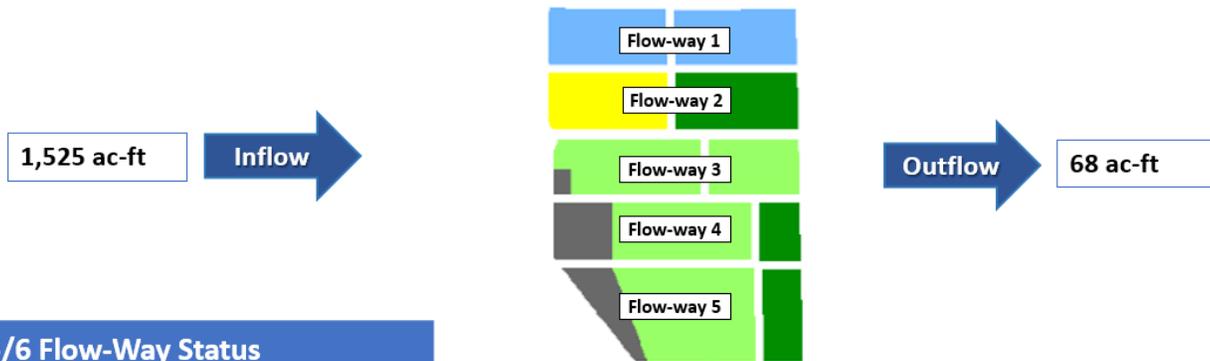
**STA-3/4 Weekly Status Report – 5/22/2023 through 5/28/2023**



STA-3/4 Flow-Way Status				As of 5/28/2023	STA-3/4 Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)	7-day	28-day	365-day	
				<ul style="list-style-type: none"> <li><span style="color: purple;">■</span> Deep Water Level (&gt; 2.8' above TS)</li> <li><span style="color: blue;">■</span> High Water Level (1.5' – 2.8' above TS)</li> <li><span style="color: lightblue;">■</span> 0.2' – 1.5' above TS</li> <li><span style="color: green;">■</span> Target Stage (TS +/- 0.2')</li> <li><span style="color: lightgreen;">■</span> 0.2' – 0.5' below TS</li> <li><span style="color: yellow;">■</span> 0.5' – 1.0' below TS</li> <li><span style="color: orange;">■</span> Low Water Level (1.0' – 1.2' below TS)</li> <li><span style="color: red;">■</span> Extreme Low Water (&gt; 1.2' below TS)</li> </ul>				
Eastern	Offline, vegetation management drawdown as of 3/1/2021				Total Inflow, ac-ft	1,197	17,296	334,877
Central			Online		--Lake Inflow, ac-ft	0	N/A	1,400
Western			Online		Total Outflow, ac-ft	1,763	22,215	322,774
					Inflow Conc., ppb	39	55	94
					Outflow Conc., ppb	18	16	16
					Includes Preliminary Data			

**Figure S-4.** STA-3/4 Weekly Status Report

STA-5/6 Weekly Status Report – 5/22/2023 through 5/28/2023



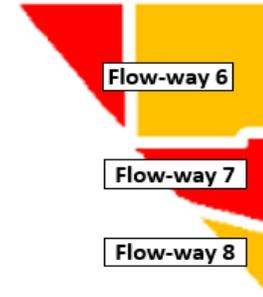
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1	← →		Online
2	← →		Avian Nesting
3	← →		Online
4	← →		Online
5	← →		Online

As of 5/28/2023	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	0.2' – 0.5' below TS
	0.5' – 1.0' below TS
	Low Water Level (1.0' – 1.2' below TS)
	Extreme Low Water (> 1.2' below TS)

STA-5/6 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	1,525	2,008	155,412
--Lake Inflow, ac-ft	0	N/A	0
Total Outflow, ac-ft	68	68	148,288
Inflow Conc., ppb	149	154	286
Outflow Conc., ppb	52	52	40
Includes Preliminary Data			

Figure S-5. STA-5/6 Weekly Status Report (Flow-ways 1 – 5)

**STA-5/6 Weekly Status Report – 5/22/2023 through 5/28/2023**



STA-5/6 Flow-Way Status				As of 5/28/2023
				Stage Based: Relative to Target Stage (TS)
				<ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: purple; border: 1px solid black;"></span> Deep Water Level (&gt; 2.8' above TS)</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: blue; border: 1px solid black;"></span> High Water Level (1.5' – 2.8' above TS)</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: lightblue; border: 1px solid black;"></span> 0.2' – 1.5' above TS</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: green; border: 1px solid black;"></span> Target Stage (TS +/- 0.2')</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: lightgreen; border: 1px solid black;"></span> 0.2' – 0.5' below TS</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: yellow; border: 1px solid black;"></span> 0.5' – 1.0' below TS</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: orange; border: 1px solid black;"></span> Low Water Level (1.0' – 1.2' below TS)</li> <li><span style="display: inline-block; width: 15px; height: 15px; background-color: red; border: 1px solid black;"></span> Extreme Low Water (&gt; 1.2' below TS)</li> </ul>
Flow-Way	Vegetation Status Healthy ----- Stressed ←-----→	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions	
6	←-----→	 1.0	Avian Nesting	
7	←-----→	 1.0	Online	
8	←-----→	 1.0	Online	

**Figure S-6.** STA-5/6 Weekly Status Report (Flow-ways 6 – 8)

## Basic Concepts and Definitions for STA Weekly Status Report

- **Inflow:** Sum of flow volume at all inflow structures to an STA.
- **Lake Inflow:** Portion of the STA total inflow volume that originates from Lake Okeechobee.
- **Outflow:** Sum of flow volume at outflow structures from an STA.
- **Total Phosphorus (TP):** Total mass of phosphorus in all its forms; including particulate, dissolved, etc.
- **Inflow Concentration:** TP concentration is the mass of TP in micrograms per liter of water,  $\mu\text{g/L}$  or ppb. Inflow concentration refers to the flow-weighted mean TP from all inflow structures over a period of time.
- **Outflow Concentration:** The flow-weighted mean TP from all outflow structures over a period of time. The outflow concentration represents the reduction of inflow TP achieved by STA treatment of the inflow water.
- **WQBEL:** The STA outflow concentration that is required upon completion of the Restoration Strategies projects by December 2025. The outflow concentration shall not exceed 13 ppb as an annual flow weighted mean in more than 3 out of 5 water years on a rolling basis and shall not exceed 19 ppb as an annual flow weighted in any water year.
- **Flow-Way (FW):** One or more treatment cells connected in series. Cells typically have emergent aquatic vegetation (EAV) in the front portion of the flow-way followed by a mix of EAV and submerged aquatic vegetation (SAV)
- **Vegetation Status:** Healthy means the vegetation condition is good and will allow the STA to perform as designed. Stressed means the vegetation is showing signs of poor health, such as browning or areas of vegetation die-off, or the cell contains undesirable vegetation such as floating exotic vegetation requiring treatment. The TP reduction capability of the STA is affected when the vegetation condition is poor.
- **Phosphorus Loading Rate (PLR):** Mass of inflow TP in grams, divided by total treatment area of STA in square meters, per year. In general, a 365-day value of less than 1.0 is needed for an STA to perform optimally. A PLR of 2.0 is considered very high and a PLR of 3.0 is considered extremely high. The TP reduction capability of the STA is affected when the PLR is high, very high and extremely high.
- **Online:** Online status means the FW can receive and treat inflow.
- **Online with Restriction:** The FW can receive and treat inflow, but the amount of flow or water level may be limited temporarily. For example, a vegetation rehabilitation effort may require reduced flows through an area while the new plants are establishing, or nesting by protected species may require a certain water level not to be exceeded.
- **Offline:** The FW is unable to receive and treat inflow due to repairs, construction, or other prohibitive reasons.
- **Depth:** Difference between the average surface water level in a cell and the average ground elevation in that cell. Target depths, or depths between flow events, are between 1.25 ft to 1.5 ft. As depth approaches or drops below zero, an increasing percentage of the cell is considered dry and STA conditions deteriorate. An increase in depth above target depth is expected with increasing flow. However, as depth increases much above the target depth and is sustained over a period of time, it can be detrimental to vegetation health and overall STA treatment performance.
- **Note:** The data provided in this summary report were developed using a combination of provisional and quality-assured flow and water quality data. In some cases, best professional judgment was used to estimate missing data and revise questionable data. Values provided are not considered final but are appropriate for use in STA operational decision-making.

## Everglades

### **Water Conservation Area Regulation Schedules**

Daily rainfall within Everglades Protection Area (EPA) last week resulted in widespread accumulation in every basin. WCA-1: Last week stage at the 1-8C rose quickly then leveled late last week. The average on Monday was 0.30 feet above the flat Zone A1 regulation line. WCA-2A: Stage continued to fall at the S11B–HW gauge then rose quickly late in the week. The average on Monday was 0.59 feet above the flat regulation line. WCA-3A: The Three Gauge Average stage rose and then steadied last week. The average stage was 0.45 feet below the falling regulation line on Monday. WCA-3A North: At gauge 62 (Northwest corner) stage ascended then steadied, the average on Monday was 0.53 feet below the now rising Upper schedule line (**Figures EV-1 through EV-4**).

### **Water Depths**

The SFWDAT tool illustrates current stages in the EPA remain low in the far west, and stages are rising first in Mullet slough region. Stage has risen in northwestern WCA-3A with only a small area remaining significantly belowground. Eastern WCA-3A along the upper reaches of the L-67s remain ponded. Hydrologic connectivity strengthens within the main sloughs of Everglades National Park (ENP). Comparing current WDAT water depths to one month ago, conditions within the eastern EPA are drier compared to one month ago but significantly wetter in central Big Cypress National Preserve (BCNP). Looking back a year ago, conditions are wetter across the entire EPA region; significantly so in eastern WCA-3A, and to the east and west of Shark River Slough (SRS) in ENP (**Figure EV-5 and Figure EV-6**). Comparing current conditions to the 20-year average on May 28<sup>th</sup>, depths are now above average across the EPA except the historically ponded southern WCA-3A (**Figure EV-7**).

### **Taylor Slough and Florida Bay**

Total weekly rainfall averaged 1.7 inches in Taylor Slough and Florida Bay over the past week (Monday-Sunday) based on the 18 gauges used for this report. Rainfall ranged from 0.2 inches at Whipray Basin (WB) in the central Bay to 5.2 inches at Taylor Slough Bridge (TSB) in the northern slough. Stages across most of Taylor Slough increased, averaging an increase of 0.3 feet and ranging from a decrease of 0.02 feet at station EPSW in the southern C-111 area to an increase of 0.71 feet at TSB (**Figure EV-8 and Figure EV-9**). Water levels at many sites are now aboveground. Taylor Slough water levels are above the historical average for this time of year by 8.9 inches compared to before the Florida Bay initiative (starting in 2017), an increase of 3.1 inches from last week.

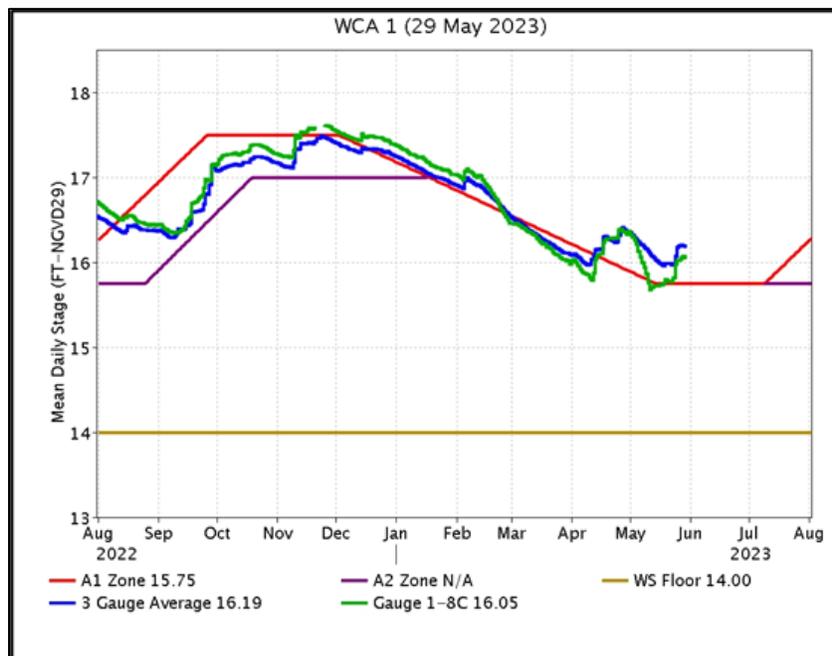
Average Florida Bay salinity was 36.5, 0.1 higher than the previous week. Salinity remained similar to the previous week at many sites and ranged from a decrease of 0.23 in Long Sound to an increase of 4.6 in Joe Bay (JB), both in the eastern nearshore region (**Figure EV-8**). Salinities remain within the interquartile range (IQR) for the Eastern, Central and Western regions of the bay (**Figure EV-10**). Florida Bay salinity is 0.3 above its historical average for this time of year, down 0.8 from last week.

### Water Management Recommendations

Balancing basin inflows and outflows, allowing for a natural rate of stage change has ecological benefit as we transition to the wet season. Operations that elevate the ascension rates above 0.18 feet per week would have detrimental ecological impacts in sensitive regions of the EPA. As conditions remain at the 90th percentile in SRS, when water is available, flow through Taylor Slough has ecological benefit downstream. Individual regional recommendations can be found in **Table EV-2**.

**Table EV-2.** Previous week’s rainfall and water depth changes in Everglades basins.

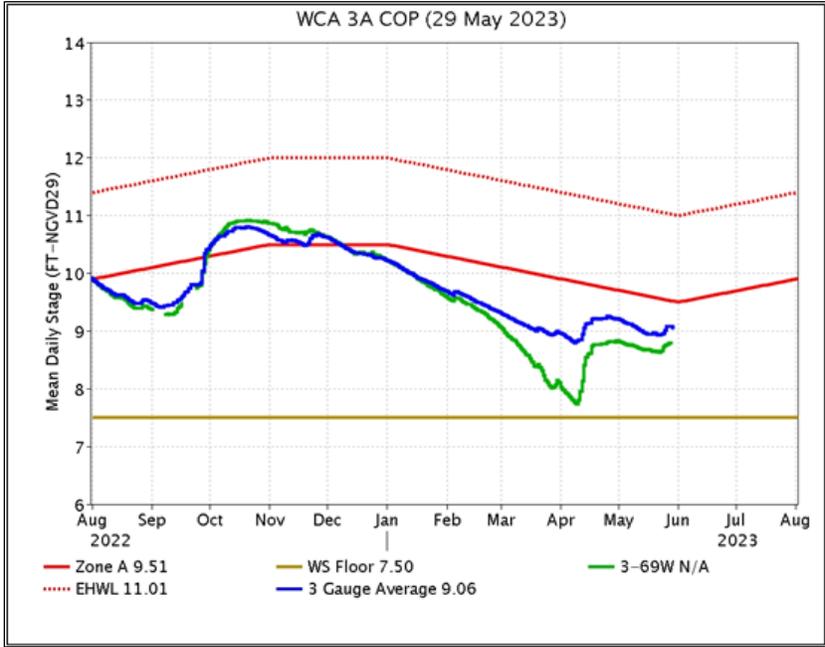
Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	3.16	+0.20
WCA-2A	2.11	-0.03
WCA-2B	1.29	-0.08
WCA-3A	2.96	+0.21
WCA-3B	2.34	+0.11
ENP	2.49	+0.20



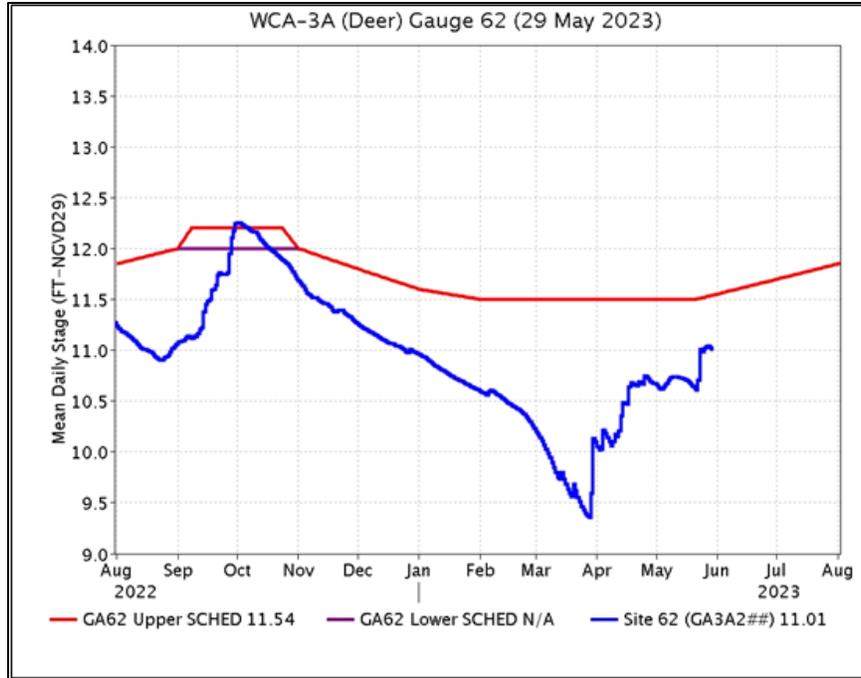
**Figure EV-1.** WCA-1 stage hydrographs and regulation schedule.



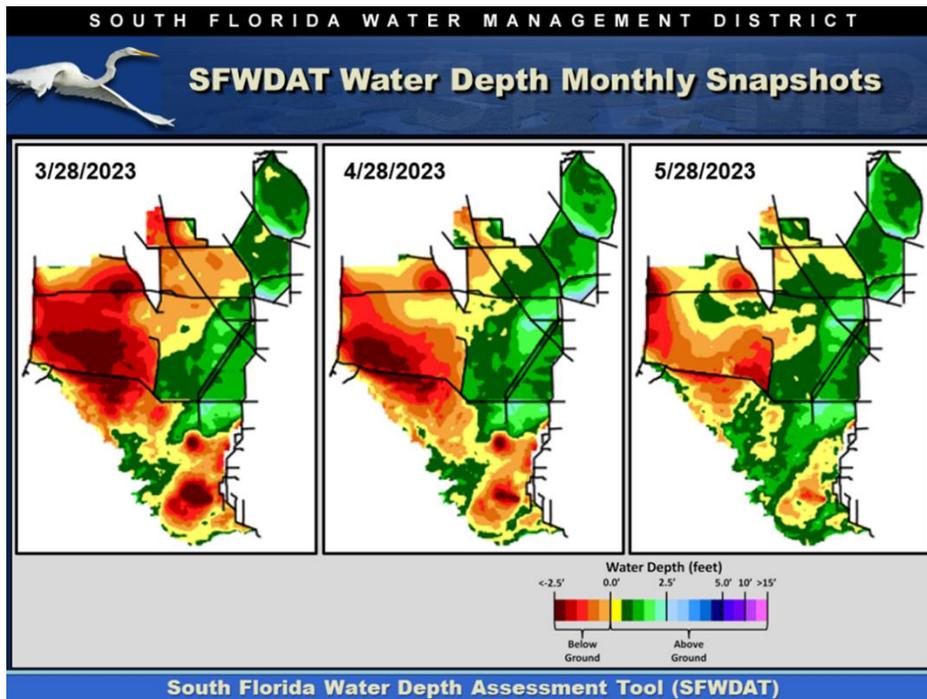
**Figure EV-2.** WCA-2A stage hydrographs and regulation schedule.



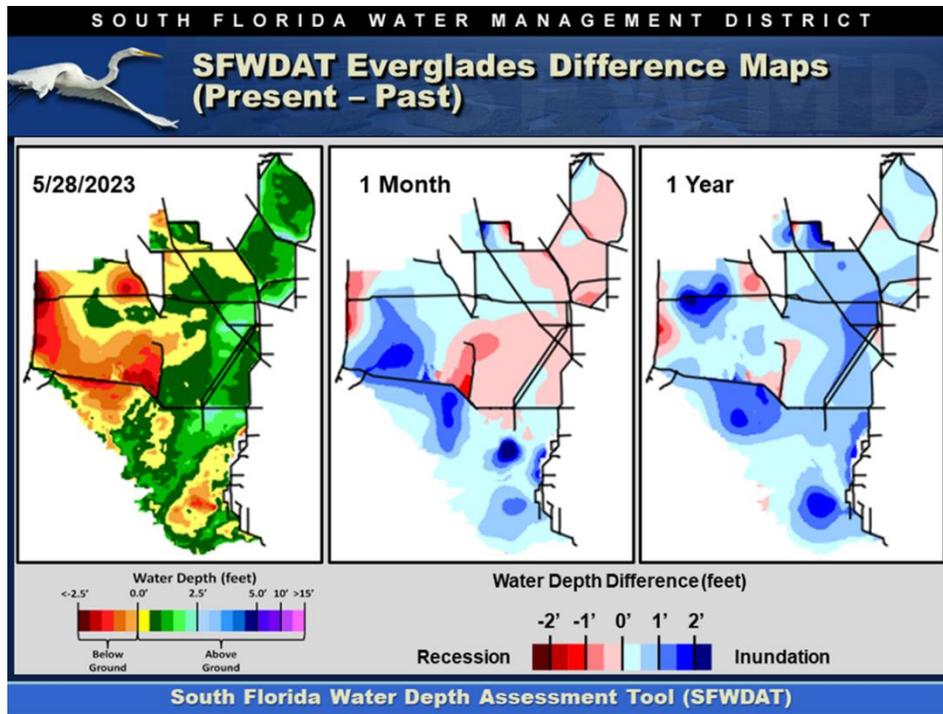
**Figure EV-3.** WCA-3A stage hydrographs (three-gauge average, 3-69W) and regulation schedule.



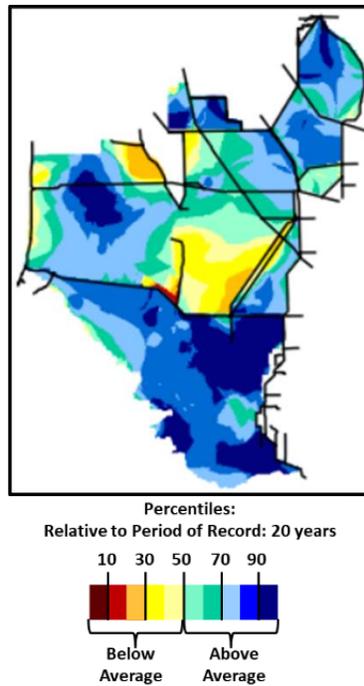
**Figure EV-4.** WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.



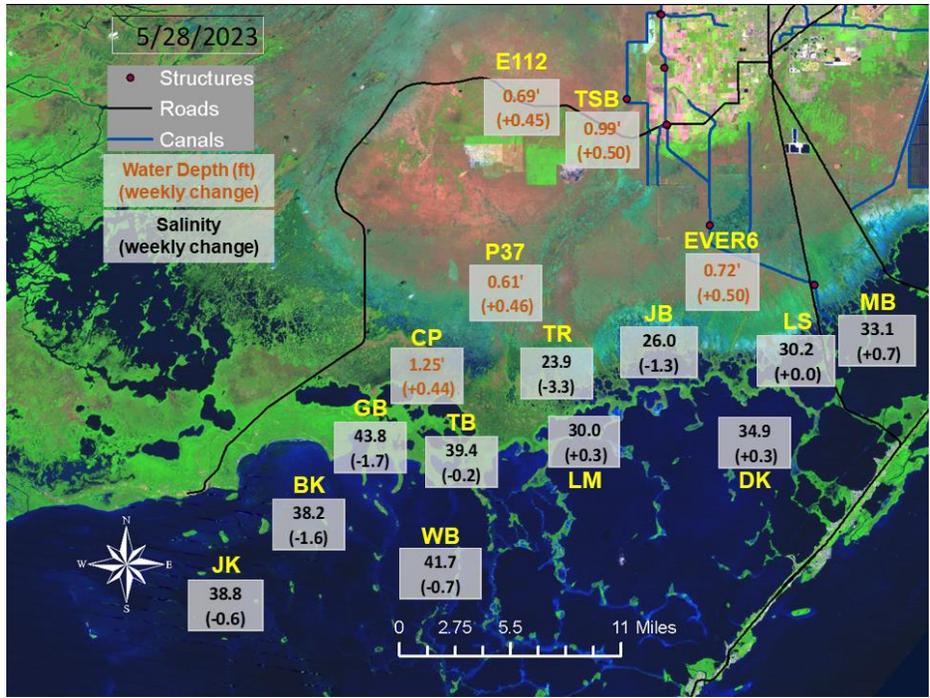
**Figure EV-5.** Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.



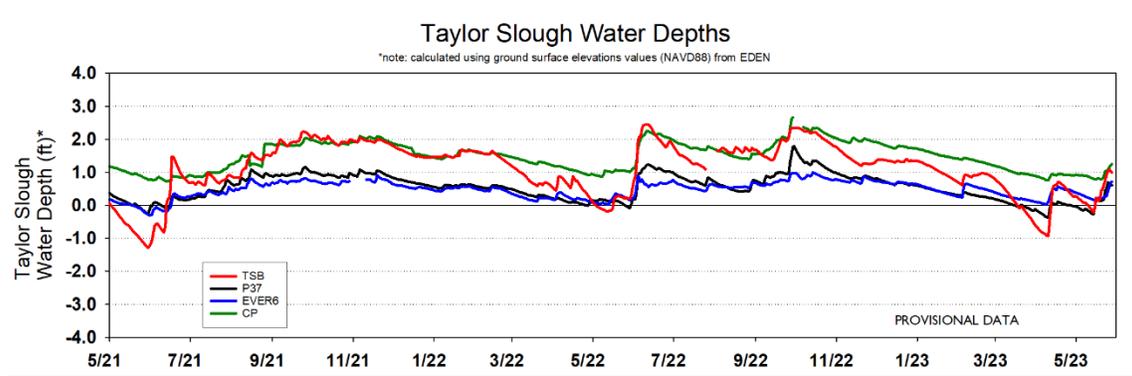
**Figure EV-6.** Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.



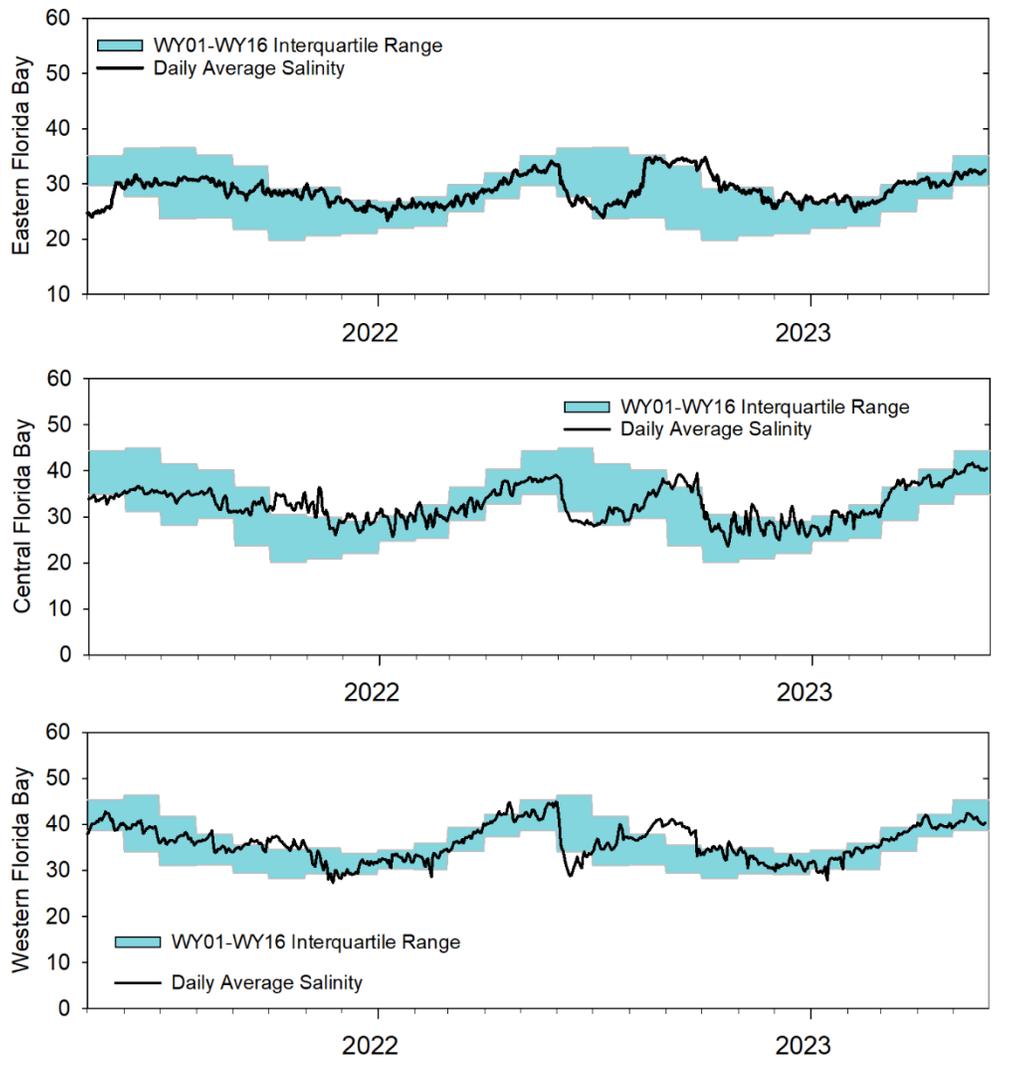
**Figure EV-7.** Present water depths (5/21/2023) compared to the day of year average over the previous 20 years.



**Figure EV-8.** Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.



**Figure EV-9.** Taylor Slough water depth time series.



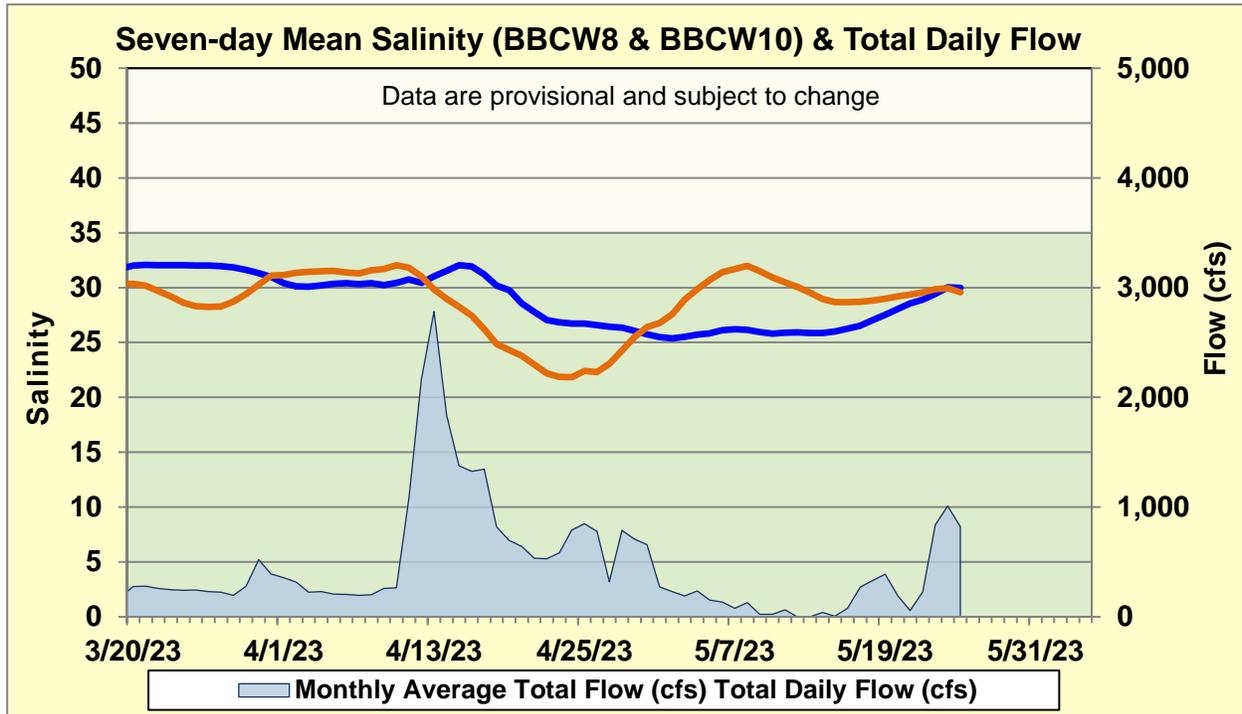
**Figure EV-10.** Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

**Table EV-2.** Weekly water depth changes and water management recommendations

<b>SFWMD Everglades Ecological Recommendations, May 30, 2023 (red is new)</b>			
	Weekly change	Recommendation	Reasons
<b>WCA-1</b>	Stage increased by 0.20'	Ascension rate of less than 0.18' per week.	Protect within basin and downstream habitat and wildlife. Assist in creating conditions acceptable for Rx burn.
<b>WCA-2A</b>	Stage decreased by 0.03'	Balance inflows and outflows. Allow water to flow south from this basin until 11.6 NGVD at the 2-17 gauge. Recession rate of less than 0.10' per week.	Protect within basin and downstream habitat and wildlife.
<b>WCA-2B</b>	Stage decreased by 0.08'	Ascension rate of less than 0.18' per week.	Protect within basin and downstream habitat and wildlife.
<b>WCA-3A NE</b>	Stage increased by 0.24'	Ascension rate of less than 0.18' per week.	Protect within basin and downstream habitat and wildlife.
<b>WCA-3A NW</b>	Stage increased by 0.42'	Ascension rate of less than 0.18' per week.	
<b>Central WCA-3A S</b>	Stage increased by 0.07'	Ascension rate of less than 0.18' per week.	Protect within basin and downstream habitat and wildlife.
<b>Southern WCA-3A S</b>	Stage increased by 0.011'		
<b>WCA-3B</b>	Stage increased by 0.11'	Ascension rate of less than 0.18' per week.	Protect within basin and downstream habitat and wildlife.
<b>ENP-SRS</b>	Stage increased by 0.20'	Make discharges to ENP according to COP and TTFP protocol while adaptively considering upstream and downstream ecological conditions.	Protect within basin and upstream habitat and wildlife.
<b>Taylor Slough</b>	Stage changes ranged from +0.27' to +0.50'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
<b>FB- Salinity</b>	Salinity changes ranged from -1.7 to +0.3	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.

## Biscayne Bay

As shown in **Figure BB-1**, mean total inflow to Biscayne Bay was 504 cfs, and the previous 30-day mean inflow was 300 cfs. The seven-day mean salinity was 30.0 at BBCW8 and 29.2 at BBCW10, both within the ideal salinity range for estuarine organisms in this region (salinity less than 35). Data were provided by Biscayne National Park.



**Figure BB-1.** Seven-day mean salinity at BBCW8 and BBCW10 and total daily flow in Biscayne Bay. Total daily flow was calculated using flow from structures S20G, S20F, S21, S21A, S123, and S700P.